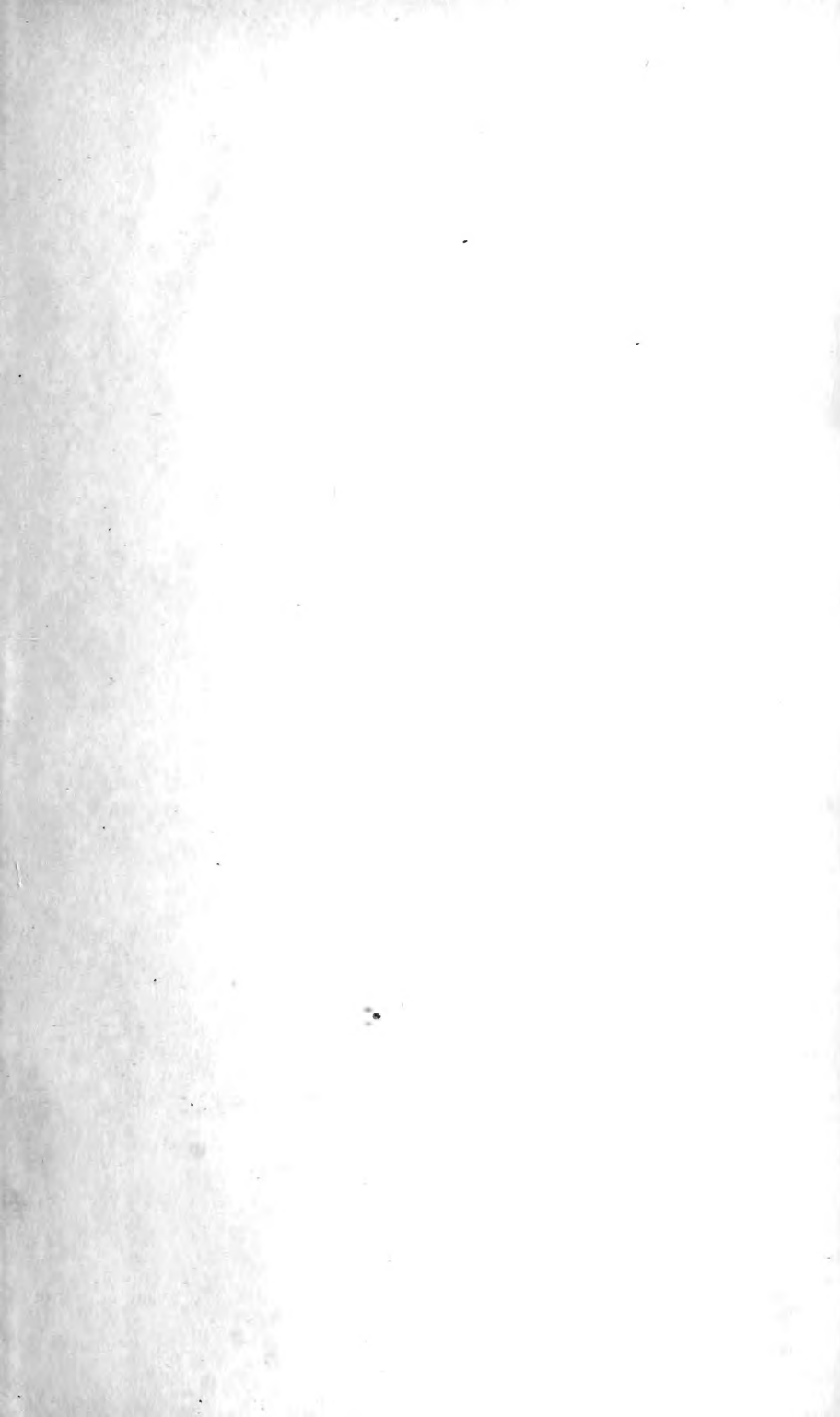


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THE GLASGOW NATURALIST.



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CONTENTS.

PAPERS—

	PAGE
Early Tree-planting in Scotland. Historical Notes. Hugh Boyd Watt, - - - - -	1-21
Night Notes of some Birds. John Robertson, - - - - -	22-25
Some additions to the Fresh-water Algae of the Clyde Area. George Lunam, - - - - -	25-27
Notes on Alien Plants found near Paisley. D. Ferguson, - - - - -	28-30
On some Flowering-plants exhibited. Peter Ewing, F.L.S., - - - - -	31-32
The Birds of East Renfrewshire. John Robertson, - - - - -	41-59
A Preliminary Investigation of <i>Cladothrix dichotoma</i> (Cohn). David Ellis, D.Sc., Ph.D., F.R.S.E., - - - - -	59-70
Robert Service, - - - - -	73-76
Laboratory Aquarium Notes. James F. Gemmill, M.A., M.D., &c., - - - - -	77-81
Occurrence at Ardrossan of the Corky-scab Potato-disease, <i>Spongospora scabies</i> (Berk.) Mass. D. A. Boyd, - - - - -	82-85
Silver Tree Seeds and Seedlings (with Plate I.). R. S. Wishart, M.A., - - - - -	86-92
The Return of Summer-birds to the "Clyde" Area in 1911. John Paterson, - - - - -	92-95
Notes on the Ash Trees (<i>Fraxinus excelsior</i> , L.) of the Clyde Drainage Area. John Renwick, - - - - -	105-114
Table of Measurements of Ash Trees in Clyde Drainage Area. John Renwick and Richard M'Kay, - - - - -	115-118
Large Grey Poplars (<i>Populus canescens</i> , Lin.) at Mauldslee Castle. John Renwick, - - - - -	119-120

NOTES—

Ruff (<i>Machetes pugnax</i>) in Lanarkshire. John Paterson, - - - - -	32
Increase in the numbers of the Jay (<i>Garrulus glandarius</i>) on Inchtavannach, Loch Lomond. K. and R. M. Buchanan, - - - - -	32-33
Common Guillemot (<i>Uria troile</i>) in Glasgow Harbour. W. R. Baxter, - - - - -	33
Common Guillemot (<i>Uria troile</i>) inland in Renfrewshire. John Paterson, - - - - -	33
Experience with a Storm-petrel (<i>Procellaria pelagica</i>) near Portree. Alex. Ross, - - - - -	33-34
A notable Sycamore. John Renwick, - - - - -	34
Mealy Redpole (<i>Linota linaria</i>) in Ayr, Lanark, and Renfrew. Robert W. S. Wilson, - - - - -	34-35

NOTES—Continued.

	PAGE
Flamingo (<i>Phœnicopterus roseus</i>) in Dumbartonshire. John Paterson, - - - - -	35-36
<i>Gallerucella fergussoni</i> , Fowler, a Beetle new to Science, from Possil Marsh and Frankfield. Anderson Fergusson, - -	36
The Arrival of Summer Visitors in Scotland and the North of England. John Paterson, - - - - -	36-37
Flamingo (<i>Phœnicopterus roseus</i>) in Clyde estuary. John Paterson, - - - - -	71
Teal (<i>Nettion crecca</i>) from Denmark, shot at Glenorchard. James Bartholomew, - - - - -	71
<i>Cassida nobilis</i> , L., a Beetle new to Scotland, in Dumbartonshire. Wm. Evans, - - - - -	96
Glaucous Gull (<i>Larus glaucus</i>) and Iceland Gull (<i>L. leucopterus</i>) in Ayrshire. John M'Crindle, - - - - -	96
Ringed Plover (<i>Ægialitis hiaticola</i>) in Lanarkshire. John Paterson, - - - - -	96
Black Tern (<i>Hydrochelidon nigra</i>) Turtle-Dove (<i>Turtur communis</i>), and Scaup Duck (<i>Fuligula marila</i>) in Renfrewshire. C. Stephen Bine Renshaw, - - - - -	97
Great Spotted Woodpecker (<i>Dendrocopus major</i>) in Lanarkshire. John Paterson, - - - - -	97
Great Skua (<i>Megalestris catarrhactes</i>) off the Ayrshire coast in July. John M'Crindle, - - - - -	126

PROCEEDINGS OF THE SOCIETY—

<i>Gryllotalpa gryllotalpa</i> , L., from Jamestown; <i>Ornithomyia avicularia</i> , L., from Aviemore and Nethy Bridge; <i>O. lagopodis</i> (Sharp), from Dingwall; and <i>Liptotena cervi</i> , L., from Brodick. Exhibit by J. J. F. X. King, F.E.S., - -	99
<i>Erophila verna</i> (L.), Meyer, from Islay, new record; <i>Sedum villosum</i> , L., from Lanark, new record; <i>Scandix Pecten-Veneris</i> , L., from Stornoway, new record; <i>Veronica hederifolia</i> , L., from Skye, new record; <i>Juncus tenuis</i> , Willd., from Killin; and other plants. Exhibit by P. Ewing, F.L.S., - - - - -	99-100
Annual General Meeting, Election of Office-bearers, &c., -	100-101
<i>Cronartium ribicolum</i> , Deitr., <i>Cucurbitaria piceæ</i> , Borthwick, and <i>Dædalia quercina</i> , all from Perthshire. Exhibit by D. A. Boyd, - - - - -	101-102
<i>Brenthis (Argynnis) selene</i> , Schiff., aberration <i>transversa</i> , Tutt, from Glen Cloy, Arran, &c. Exhibit by A. Adie Dalglish, F.E.S., - - - - -	103
<i>Juncus tenuis</i> , Willd., from Ayrshire; <i>Calluna vulgaris</i> , Salisb., var. <i>incana</i> , Reichb., and <i>Veronica officinalis</i> , L., var. <i>hirsuta</i> (Hopk.), Ewing, from Nairn. Exhibit by P. Ewing, F.L.S., - - - - -	103

PROCEEDINGS—Continued.

PAGE

Abstract Statement of Accounts, 1909-1910, - - - -	104
<i>Bipalium kewense</i> , Moseley, a Land-Planarian from Ruchill, Glasgow. Exhibit by A. Barclay, F.E.I.S., - - - -	121
Waxwing (<i>Ampelis garrulus</i>), from Helensburgh. Exhibit by W. R. Baxter, - - - - -	122
Mealy Redpoll (<i>Linota linaria</i>), from Beith, and Willow-Tit (<i>Parus atricapillus kleinschmidtii</i>), from Giffnock. Exhibit by R. S. Wilson, - - - - -	122
Pintail (<i>Dafila acua</i>) from Eaglesham. Exhibit by H. M'Culloch, - - - - -	122
Supposed Occurrence of the Natterjack Toad (<i>Bufo calamita</i> , Laurenti) at Balquhadder. T. Beath Henderson, M.D., -	122
<i>Tetraphis Browniana</i> , Grev., from East Kilbride. Exhibit by John R. Lee, - - - - -	123
Meteorological Notes for 1910. James Whitton, Superin- tendent of Parks, Glasgow, - - - - -	124
<i>Pinguicula lusitanica</i> , L., from Kames. Exhibit by Alex. Ross, - - - - -	125
<i>Helophorus tuberculatus</i> (Gyll.), a Beetle new to Clyde. Exhibit by Wm. M'Leod, - - - - -	125
Various Flowering Plants, &c., from Kirkoswald and Maybole Parishes, Ayrshire. Exhibit by John Robertson, - -	126

REVIEWS—

The Home-Life of the Spoonbill, &c., - - - - -	38
The Birds of Dumfriesshire, - - - - -	38-40
The Liverworts: British and Foreign, - - - - -	71-72
Photography for Bird-Lovers, - - - - -	97-98
How to Attract and Protect Wild Birds, - - - - -	98
The Life of the Common Gull told in Photographs, - -	126-127
Bird Protection and the Feather Trade, - - - - -	127
Modern Geography, - - - - -	127
Bulletin of the British Ornithologists' Club, Vol. XXVIII.,	127-128

INDEX, - - - - -	129-134
------------------	---------



The Glasgow Naturalist

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Vol. III., No. 1.]

[November, 1910.]

Early Tree-planting in Scotland.

HISTORICAL NOTES.

By HUGH BOYD WATT.

[Read 25th October, 1910.]

SYSTEMATIC planting of trees on an extensive scale has been practised in Scotland for a period of nearly two hundred years. The character of the woodlands has been so greatly changed, that a recent writer is not sure if there is any large wood which can be said to be wholly indigenous in Great Britain now (6) *—a statement which certainly requires the qualifications made, so far as it applies to Scotland. In other ways we hear so much of the benefits and needs of afforestation and of neglect of forestry affairs that it is well to recollect that Scotland has actually been the area of experiments in arboriculture (I do not say forestry) on a scale unknown in any other country of the world, except England, in some ways. The small number of kinds of trees growing in Scotland two hundred years ago, and the long list of species now found flourishing, illustrate this point and mark off the modern period. The present review will not extend to that period, but some account of earlier and less-known times up to the year 1750 will be given—native, naturalised, and exotic trees being taken into consideration. Of the early native woodlands and forests the writer has attempted to

* The numbers within brackets throughout refer to the authorities given at the end.

treat elsewhere, and nothing more need be said of them here (29), but in an Appendix hereto are given the names of indigenous trees and those introduced up to 1770.

At the beginning of the historical period and for centuries thereafter, the small amount of evidence available as to tree-planting is not of a positive character. It is said that before the third century the Apple, which is conjectured to have been brought into Britain "by the first colonies of the natives, had spread over the whole island, and so widely that, according to Solinus, there were large plantations of it in the Ultima Thule" (15). Fruit-bearing trees would probably be the first introduced by man, for in early times the need of planting for timber supply would not be felt, native trees being abundant and accessible. The Wild Pear, for instance, is looked on as an introduction which reverted to a wild character. During the Roman occupation several species of trees were brought into Britain. According to Professor W. Somerville, these number only four kinds, viz., the English Elm, the Sycamore, the Lime, and the Spanish Chestnut; but, in addition to these, the Poplar, the Walnut, the Box, and other trees of the garden and orchard have been named as contemporaneous with Roman times. I know of no proof that any of these trees reached Scotland during the Roman period. In the investigation of the remains from the Roman Military Station at Newstead, Melrose, some seven different kinds of trees were determined, viz., Oak, Birch, Hazel, Poplar (or Willow), Alder, Rowan, and Whitebeam (26). The last named is native to England, but not to Scotland, so far as I know. Ash was found in the shape of handle-shafts, without evidence that it was procured locally, although this may have been the case, this tree being recognised as native in South Scotland. Coniferous and Beech wood did not occur amongst the Newstead remains (26).

In referring to the Roman period, Cæsar's statement (*De Bello Gallico*, V. 12) that all kinds of timber (*materia*) were on Britain with the exception of the Fir (Silver Fir) and the Beech must not be overlooked. The comparison is with Gaul, and to question Cæsar would be an offence not less heinous than to speak disrespectfully of the equator.

With the coming of the Churchmen and the foundation of monasteries and other ecclesiastical establishments somewhat more tangible evidence of tree-planting is forthcoming. The remains of orchards, gardens, and enclosures around these old building-sites to-day afford visible, although indefinite, proofs of planting. That trees were appreciated by the residents not only for their value as timber and for utilitarian purposes, but also in an aesthetic or protective sense, is shown by expressions such as that used by the writer or transcriber of the *Book of the Dun Cow* (early Irish, about 1100), when he says :—

“ A hedge of trees surrounds me ;
Well do I write under the greenwood.”

Traces of old orchard trees remain to the present day at such places as Melrose, Haddington, Jedburgh, and Lindores Abbey. At the last-named place old Pear trees still survive, or survived until recently, one of them reputed to be the largest of its kind in Scotland (Alexr. Laing's *Lindores Abbey*, 1876).

The Chronicles, Charters, and Registers of these old foundations, and also other records relating to land and property, while frequently mentioning woodland rights and privileges, such as the cutting of Oaks for timber (12), are almost entirely silent on the subject of tree-planting, probably for the cogent reason that no such practice was in existence, except in a casual and fortuitous way. In an account of the bailiff of the King's Manor of Jedworth in 1288, the construction of ditch and hedge (*fosse et haye*) about both the wood and meadows of the place named is charged for, and Cosmo Innes gives this as the earliest instance known of such a fence (12). In 1473 the tenants of the Cistercian Abbey of Coupar-Angus were bound to “ put al the land to al possibil policie in biggin of housis, plantacioun of tries—eschis, osaris and sauchs and froit tries,* gif thei mai ” (13). In 1510 a lease given by the Crown to Patrick Murray held him bound to maintain the plantations of Oak and of all other trees necessary on certain lands in Selkirkshire, where, apparently, plantations then existed. Traditions such as these which assert that

* Ashes, osiers, sallows, and fruit trees.

the old Oaks of Cadzow Forest were planted by David, Earl of Huntingdon, afterwards David I. (1124-1153), and the Yews of Inch Lonaig, Loch Lomond, at the time of Robert the Bruce (1306-29), to supply bows for his men, seem to be supported only by constant repetition, not by any proof or authority. John Walker (1731-1803), whose writings on Scottish trees are a great source of original information, expressed the opinion that for the period of near one thousand years after the departure of the Romans it was "not likely that any foreign trees were established in England" (27), and I have heard Professor W. Somerville make a similar statement. Walker remarks that the first "barren" trees planted in Scotland were those of exotic growth (28), but this requires qualifications, as will appear later on. He gives the Elder * as the first of such kinds of trees planted, and the Plane (Sycamore) as next in antiquity, adding that these are the only two barren trees planted in Scotland till towards the middle of the seventeenth century (27). Loudon writes of the Spanish Chestnut and Beech as probably introduced into Scotland by the Romans, and perhaps reintroduced by the religious orders in the Middle Ages (15). This has no certain sound, and, if I might venture on another conjecture, it is that the source of these and other kinds of trees may have been France during the long period of intercourse between Scotland and that country which followed the alliance begun under John Balliol in 1295, or from Scottish connections with the Low Countries.

The devastations and havoc of the Wars of Succession and Independence, at the end of the thirteenth and beginning of the fourteenth centuries, and their after-effects, did much to waste the tree growth of Scotland. With the beginning of Stuart times a spirit of concern becomes apparent regarding the woodlands, as is shown by the contents and tenor of various Acts of the Scottish Parliaments (1).

As early as 1424 there is an Act imposing a penalty on stealers of greenwood and destroyers of trees. In 1457 tenants are ordained to plant woods and trees, make hedges

* Occurs in neolithic deposits near Edinburgh (24). Further, it is a fruit-bearer.

and sow broom; and in 1503 the earlier Acts are supplemented by a further measure, based on the ground of "the wood of Scotland being utterly destroyit." That this was an exaggeration is clear from the Act itself, one of its requirements being that every land-owner plants at least one acre of wood where there is "na gret woode nor forreste." Apparently the wood had not actually been all destroyed. The year 1535 gives another strong measure, with provisions for further planting, and going so far as to enact that destroyers of greenwood should be punished with death for the third offence. In 1555 the wood of Falkland being found old and decayed, is dealt with, the Estates ordering that it be "new parkit, agane keipit and hanit for rysing of zoung growth." In the same year the earlier Acts are ordered to be published anew throughout the realm, and enforced on all points. At later dates fresh Acts of a similar tenor are passed, and the older Acts for planting and against destroying wood are ratified and extended. An Act of the year 1661 requires heritors to enclose and plant four acres yearly with trees for the next ten years, and is of additional interest in that it names specific trees—"Oak, Elme, Ash, Plaine, Sauch, or other timber." The Plane (Sycamore) is evidently classed as a naturalised tree then. Contemporaneously with these general Acts are others having particular application only. These show that the continual reiteration of planting requirements does not imply that the Acts were entirely without effect, as has been perhaps sometimes inferred. Thus, in 1703, Lord Ross is allowed to shut up a road through his park at Halk-head, because it interfered with his planting and policy; and a similar provision is made on behalf of Lord Melvill at Melvill House. In 1705 Sir David Cunninghame of Milncraig is allowed to alter the highway about his house, for the sake of an enclosure he had made; and, in 1706, Lockhart of Carnwath, to alter the highway in order to enclose a park (1). Other documents dating from the period of the Stuarts to the Union (1707) show planting requirements laid upon individual places and persons. For example, in 1616 certain of the Western Island chiefs were bound over at Edinburgh (amongst other things) to have "policie and planting" about their

houses (10). Donald Monro, who described these islands in 1549, notes woods and trees frequently, but makes no mention of any planting (20).

The point now reached in our review seems an appropriate opportunity to devote a paragraph to mentioning a few old individual trees dating from previous to the year 1600, which survived until a recent date, or still survive, and whose history is so far known that an approximation may be made to the date of their planting. With this warning, accordingly, the following may be enumerated on the authority of Walker (28) and Hutchinson (11):—

Spanish Chestnut.—Walker characterises one at Finhaven, Forfarshire, as the oldest planted tree extant in Scotland, estimating its age as 500 years, which would take it back to about the year 1300; at Kinfauns, Perthshire, planted earlier than 1560; at Otterstone, Fife, about 1589.

Sycamore.—"The big tree in Kippenross" may have dated from about the year 1400; the "Corstorphine Plane" from later than 1429; one at Newbattle, Midlothian, from before 1530; others at the last-named place and at Calder House, Midlothian, were pre-Reformation (1560); at Scone, about 1600.

Beech.—At Newbattle, Taymouth, Ormiston, and Oxenford, between 1540 and 1560, but Dr. D. Christison considers that the Newbattle trees are probably somewhat later in date; at Otterstone, Fife, about 1589. At Murthly several are given as from 700 to 800 years of age (10), but some error is here.

Walnut.—At Otterstone, Fife, about 1589.

Old Oaks and Yews are of so mythical antiquity that no enumeration is attempted here. No claim is made that even the above-named dates are unquestionable, but all are considered to be probable, and are on good authority.

Towards the end of the sixteenth and the beginning of the seventeenth centuries the progress of planting is evident from historical records, such as will now be given.

Inveraray, however, should be looked upon as preceding the period just named, for the late Duke of Argyll, in 1896, in giving evidence before a Committee of the House of Commons

on a projected railway to Inveraray, stated that the narrow border of level land there, between the mountains and the sea, had been continually planted by his family for 400 years, with the view of making a park and pleasure grounds. At a later time than is thus indicated, a writer, who probably dates from about 1630, found at the Earl of Argyll's "Pallace" "zairds planted with sundrie fruit trees verie prettilie" (17). The same is said of Ardkinglas; and this writer also states that Ardmore (Cardross) and the Ross, Rosneath, were well planted—that is previous to 1630 (17).

In 1583 John Anstruther of that Ilk sues certain people of Crail for plucking up the "haill asches that he had laitlie plantit and uther young growth thairabout" (23). Cosmo Innes (13) describes the general style of planting at this period as avenues of double rows of Ash and Sycamore, and lines of these trees round the fields, with a small admixture of Walnut and Chestnut (Spanish Chestnut), and names the first Earl of Gowrie (executed 1584) as having done planting of this kind. In 1586, James, Lord Ogilvie, is found writing to Sir David Lindsay of Edzell "concerning my planting . . . your thowsand young birkis sall be richt welcom"—which shows a native tree being utilised. Fynes Moryson (1598; one of the earliest travellers in Scotland, whose narrative is known) found Seton Castle "beautified with faire orchards and gardens;" and in Fife the "noblemen's and gentlemen's dwellings commonly compassed with little groves, though trees are so rare in those parts as I remember not to have seene one wood." On the west side of Scotland, he says, are "many woodes" (3). A later traveller, Sir William Brereton (1636) amplifies the information about Seton by naming "Apple trees, Walnut trees, Sycamore, and other fruit trees, and other kinds of wood which prosper well;" and John Ray (1662) confirms the western observation by saying that the country about Hamilton is "in all respects for woods, pastures, corn, &c., the best we saw in Scotland" (3). An earlier writer, Bishop Leslie (1578), says—"Cludisdal amang fair forrests and schawis schene; with thiker wods some are decored" (14). In an Act of Parliament of 1641 parks and plantings are described as "decore-

mentes," so apparently the bishop knew or had heard of planting in the Clydesdale of his day. Timothy Pont * gives a detailed description of the district of Cuninghame in Ayrshire in 1604-8. The tract near the sea coast is described as well planted, especially about Stewarton and Irvine. Many other places are named with the same characterisation; for instance, Auchinhervie, Blair, Corsehill, Craufurdland, Cuninghamehead, Fairlie, Hasilhead, Knock, Kelburne, Kilbirnie, Kilmarnock, Montgrenan, and other places (22). In no case, however, are the kinds of trees mentioned; so that while Pont's survey is one of the first indications of general planting in Scotland, it stops short of giving specific information regarding the trees. It seems unlikely that any of the trees seen by Pont are in existence at the present day. The great Spanish Chestnut at Blair, of which some particulars are given by Dobbie in his edition of Pont's work, is now gone.

In more northern parts some of the earliest systematic planting in Scotland was done by Sir Duncan Campbell, who succeeded to the Breadalbane property in 1583, and died in 1631. Amongst the planting carried out by him was part of Drummond Hill (10). In the Baron Court books of Breadalbane in 1621 ordinances occur requiring tenants and cottars to plant young trees, "aik, asch, or plane." In the same year a Court was set at Finlarig to try numerous persons accused of cutting "aik, asch, birk, alrone, hassell, and sauch" (13). Other kinds of trees were seen in 1629 by an English traveller at Gallowshields (Galashiels), who praises Sir James Pringle there for his planting, and names "cherry trees, great store of sycamores, trees he calleth silk trees,† and fir trees" (16).

In 1632-4 the Earl of Mar, in reserving rights to the fir trees in Braemar, uses the words "woods, natural grown and other," which seem to imply that some planting had been done there previous to the date named (19).

* For an account of this remarkable Scots worthy see *The First Topographical Survey of Scotland*, by C. G. Cash (*Scottish Geographical Magazine*, Vol. XVIII., pp. 399-414, 1901), and Macfarlane's *Geographical Collections*, Vol. II., Introduction, 1907 (17).

† A name now used for *Albizia Julibrissin*, not known in this country before 1745, so some other tree must be meant. Perhaps the Mulberry.

That native trees were grown from seed in the course of the seventeenth century is shown from letters (dated 1637) of the Earl of Lauderdale and of the Marchioness of Hamilton (date probably 1630-1632), both of whom speak of using fir seed for planting. The Marchioness speaks of Lord Lindsay, her godson, as a very great planter also (13).

The above records all pre-date the appearance of John Evelyn's *Sylva, or a Discourse of Forest Trees*, which was read to the Royal Society on 15th October, 1662, and published soon after as a separate work. One of its chief objects was to stimulate land-owners to plant trees; and while more directly applying to England, it would no doubt have effect with the Scottish noblemen and gentlemen, who, following the accession of the Stuarts to the English throne, were becoming more accessible to Anglian influences.

The first published writings on Scottish tree-planting appeared before the end of the seventeenth century, and it is somewhat curious to find that the earliest was (like Evelyn's work) a communication to the Royal Society.

The *Philosophical Transactions* for 1675 contain a letter from Dr. J. Beal (2), partly devoted to *Some Hints for the Horticulture of Scotland* (pp. 361-2), in which the writer urges the advantages of developing gardens and nurseries of fruit trees, and suggests that the seeds of the Hemlock tree, Spruce, and Cedars may do well in the north. Beal comments on the use and quick success which would attach to kitchen gardens, one advantage being, as he puts it, that they would "employ thousands of poor at good work." This final commendation has a curious sound of our own day about it, and of our talk about "back to the land" and afforestation as a means of alleviating unemployment, recommendations which find support not only from Royal Commissioners and the current sentiment of the day, but apparently possess the advantage of antiquity and, like all good old things, the capacity of repetition through the centuries.

In 1683 the first book on the subject appeared in the form of *The Scots Gard'ner, in two parts, the first of contriving gardens, orchards, avenues, groves . . . the second of the propagation and improvement of Forrest and Fruit-trees.*

. . . *Published for the Climate of Scotland*," by John Reid, Gard'ner (25). This work is addressed "to all the Ingenious Planters in Scotland," and enforces "the inexpressible need of Inclosing and Planting," the writer's conclusion being that "there is no way under the sun so probable for improving our land as Inclosing and Planting the same; therefore, I wish it were effectually put in practice." Reid gives many practical directions to assist in promoting this object, and the book is of importance historically, not only in respect of this, but also because of the large number of kinds of trees named in it, which are as follows (retaining Reid's order and spelling):—*For thickets and orchards*—Pears, Aples, Plum, Cherrie, Geens, Service, Lines, Poplars, Maple, Hornbeam, Hassell, Birch, Laburnum, Aspen, Alder, Willowes, Pin, Firr, Yew; *for forrest-trees*—Oak, Elm ("good from Holland"), Ash, great Maple ("commonly but falsely called Plan"), Smaller Maple for Hedg., Beach, Walnut, Chestnut, Black Cherrie or geen, Wild Service ("commonly called Ronstree"), Line or Lidne tree ("commonly called Lym"), Hornbeam, Hassell, Filboard, Birch, the Bean-tree soil * ("vulgarly called peascod-tree"), White Poplar (Abele), Aspen, Alder, Willowes, Sallows, and Oziers; *and for greens*—Pinetree and Pinasters, Scots Firre, Silver Firre, Pitch Tree (as common Firre) (native Norroway), Yew, Holly, and Hawthorn ("tho not a green").

Reid also names many other smaller fruit trees and shrubs, amongst them Quince, Medlar, Fig, Mulberry, Almond; and, amongst evergreens, Box, Arbor-vitæ, Cherrie-bay, Cypress, Evergreen Oak, and Strawberry tree. He was gardener at Rosehaugh, Avoch, Ross-shire, and his writings show the practical man giving his own experiences, many of which were, however, probably of a tentative character. The Rosehaugh entries in my Appendix are on his authority, although he never mentions the place.

Reid's book has been re-published several times, and in the edition issued in 1766 there was included *A Short Treatise on Forest Trees, &c.*, by Thomas, sixth Earl of Haddington (8)

* Bean-trefoil.

(1680-1735). In 1761 his earlier work had been published—*A Treatise on the Manner of Raising Forest Trees*, in a letter to his grandson, dated Tynninghame, 22nd December, 1733. This writer speaks of himself as a diligent planter for upwards of thirty years, and believes that he had more trees of his own planting than any man ever planted in his lifetime. His work is of great value, as giving personal experience with the trees named. These are—Oak, Beech, Scots Elm, London Elm, Dutch Elm, Ash, Walnut, Chestnut, Plane (Sycamore), Hornbeam, Service-tree, Black Cherry (Geen), Quick-beam (Rowan or Rhoddan-tree), Laburnum or Pease-cod-tree, Mapple, Lime, Hazel, Birch, Alder, Poplar, Abele, Aspin-tree or Quaking-aspen, Willow; Firs—Great Pine, Pinaster, Evergreen Oak * and Cork-tree,* Cedar,* Yew, Holly Bays. Lord Haddington had no knowledge of the trees marked.* His father, who lived at Leslie, Fife, planted a good deal there about the year 1700, and Lord Haddington also names as others who had preceded him with planting the first Marquis of Tweeddale (died 1697), Lord Rankeilour (died 1707), and Sir William Bruce, and also the Earl of Mar, who first “introduced the wilderness way of planting amongst us” at Alloa, I infer. When Lord Haddington came to live at Tynninghame, about 1705, he found not above fourteen acres set with trees, and with those as a start he made the great developments which are illustrious in the annals of tree-planting, and permanent to the present day—in succession at any rate.

Lord Haddington's book was preceeded in publication by one not so well known or so important, but of considerable value as an indication of the spirit which was finding expression in Scotland at the period. Brigadier-General William Mackintosh of Borlum (18) (1662-1743) was imprisoned in Edinburgh for the part he took in the Jacobite rising of 1715, and while in confinement wrote *An Essay on Ways and Means of Enclosing, Fallowing, Planting, &c., Scotland, and that in sixteen years at the Furthest*, printed at Edinburgh in 1729. He says that there was very little stock of trees either barren, fruit, or hedging quicksets, but names some landowners in the north who were setting a good example in

planting. Mackintosh himself when living at Raits near Alvie in 1698 set down a row of Elms along the old military road at Kingussie, which grew to be fine trees. Another indication of the growth of the spirit of planting and cultivation in Scotland in the seventeenth century is the foundation of the Botanic Gardens, Edinburgh, in 1680, where was grown the first Cedar of Lebanon, known in Scotland, planted so early as 1683 (15). Other early dates for Cedars are Fordell, Inverkeithing, in 1693, and Biel in 1707 (11). In the Edinburgh Gardens were "every kind of tree and shrub as well barren as fruit bearing, the whole disposed in fair order" (Sibbald's *Scotia Illustrata*, 1684).

A further example of a far advanced place in respect of planting was Bargaly, Kirkeudbrightshire, where under its laird, Andrew Heron, great progress had been made before the end of the seventeenth century. About 1722 it was described as being all covered with woods . . . the grounds next Heron's house being all divided and adorned with large thickets of fir and other planting (17). Walker included in his book examples of different kinds of early planted and well-developed trees from Bargaly (28).

Some of the trees in use for seventeenth century planting are made known by the plunder carried off from Inveraray to Dunkeld in 1684-5, when the Murrays paid a visit to the Campbells, in accordance with another custom of the times. The orchard enclosures and shrubberies at Inveraray were raided, and some thousands of young trees lifted and carried off as booty. The Duke of Atholl's *Chronicles of the Atholl Family* (vol. i., p. 265) give a list (with values) of the trees, and we find the kinds named are Silver and Spanish Fir, Pinaster, Pine, Yew, Holland trees (Holly), Beech, Lime, Buckthorn, Black and White Poplar, Chestnut, Horse Chestnut, Walnut, Fir, Ash, Plane, Elm, Pear, Apple, Plum, and Cherry. The compensation claim made for the lot was settled for £13,000 Scots = £1,333 6s. 8d. sterling.

Towards the end of the seventeenth century more detailed information regarding planting becomes available. About that time the Earl of Panmure planted what are called endless Beech avenues at Panmure (13), and some of the trees of the

same kind in the town avenue at Inveraray may have been planted between 1674 and 1685. At Kinnaird the Beech is definitely dated as 1693, and an avenue of this tree was planted at Brodie Castle between 1650 and 1680. Oak, Elm, and Lime are also recorded for this period at the last-named place. At Kilcoy groups of Beeches, and also Ash trees and some Oaks and Elms are said to date from about 1685. Silver Firs were planted at Drumlanrig from 1650 to 1680, and at Drummond Castle about 1688 (11).

The dates named by authorities are, not infrequently, of a conjectural character, but nothing that seems improbable has been admitted here. Further details, similar to the above, need not now be repeated, and it may suffice to say that by the end of the seventeenth and beginning of the eighteenth century tree-planting was being extensively tried in Scotland. The movement extended from Lerwick (Shetland) in the north (but very few records from Caithness, Sutherland, and Ross) to Berwickshire and Galloway in the south, and from Buchan in the east to Armadale (Skye) and Colonsay in the west, thus covering the whole mainland and some of the islands.

In almost all cases the account given of the work is a meagre and bare statement of the fact, *e.g.*, "some planting," "regular planting," "well planted," "fine planting," "a deal of planting," "abundance of planting," "vast planting," "prodigious planting," "thickly planted," "little or no planting," "considerable planting" (17), and so on. Occasionally observations are made which are of more interest. Thus at Lerwick (previous to 1683), in addition to Apple and Cherry trees, Ashes and "Plains" were in several gardens; Aboyne (about 1724), "planted with firs fully grown, which is a great ornament and advantage to the place;" Ruthvene (1683 to 1722), a "prettie oakwood;" Carraldstoune (same period), "extraordinary much planting . . . ane excellent avenue with ane rainge of great ashtrees;" Finhaven (same period), "has some bushes of wood up the water," but the historical Spanish Chestnut is not mentioned; Panmure (same period), "extraordinaire much planting, young and old," showing that the beginning was some time back; Urie (about 1722), "near a hundred thousand fir trees, thought to

be the most considerable planting of firs near the East sea between the Murray Firth and Dover Castle," also Elms, Birch, and Willows are mentioned as planted at Urie, and "twenty-five different sorts of barren trees;" Eden's Moor, Monimail (1723), "some million of firrs all thriving wonderfully;" Duncrub, Duhning (1723), "broad avenue planted on each side with severall rows of ash and firr trees;" Muthill (about 1723), "large firr parks, some whereof have trees grown to a considerable bigness, and others are but lately planted," also "beautiful avenues going to severall airths;" the Kerses, Stirringshire (1723), "most of the gentlemen's houses look like little woods for the number of planting;" the Tor-muir (1723) is enclosed and planted; Castle of Cardross, Port (1724), "great deal of old beautiful planting;" Inchcalloch or Buchanan (1724), "very handsome enclosures with very regular planting," near the Endrick; Rossdhu, Luss (1724), "regular planting;" Wishaw House (about 1723), "with a vast planting, most of them all come to perfection in the planter's own time;" Raith, Bothwell (same writer), "a pritty large platt of firrs as a vistoe to the house, just opposite to the mouth of the great avenue;" Erskine (about 1725), "abundance of excellent stately barren planting with pleasant woods;" Walkinshaw (same writer), "excellent regular avenues of barren timber;" Pollok (1696 to 1710), "excellently well planted, with a great deal of regular and beautiful planting" (Crawford's *History of Renfrewshire*, 1710); Shire of Edinburgh (about 1647), "moderately planted with trees, especially about the noblemen's castles and gentlemen's houses;" Bowhill, Selkirkshire (1722), "parks and planting very pleasant;" Carrick (1683 to 1722), "every gentleman has by his house both wood and water, orchards, and parks," and many places in the district are named as planted; Adamtoun, Kyle (1723), "a great dale of planting;" Ochiltree (1723), "a vast dale of young barren timber;" Underwood, Barnweill (1723 to 1732), "abundance of very handsome young planting of all sorts;" Minigaff (about 1726), "Palgown surrounded with pretty groves of Scots Pine, Black Cherries, and other kinds of planting, which make a fine

umbello to the house;" and Lochurr (1684 to 1692), "planting of Sauch or Willow trees about it" (17).

It should be remarked that the dates named are those of the writings quoted from and consequently are later than the actual planting of the trees which they record.

Perthshire, so rich in woodlands, has planted trees dating from the earliest in many places. In addition to those already mentioned, there are Lawers; Murthly Castle (where two old Spanish Chestnuts are "supposed to have been amongst the original trees brought into this country by the monks"); Dunsinane; Scone (where are Sycamores planted by Queen Mary and James VI.); Moncrieffe (Horse Chestnut, supposed to have been planted about 1679); Kilgraston; Dupplin (has Silver Firs, amongst the first planted in Scotland); Blair Drummond; and Drummond Castle (10).

Sir John Clerk of Penicuik (Midlothian) (1676-1755) found the estate in his earlier years little more than a bare upland waste. "In 1703," he writes, "I . . . fell exceedingly into the humure of planting and making nurseries," with so effective a result that about thirty years later we find him saying he has planted more than 300,000 trees, which, he remarks, "in time may be of considerable value" (4).

John Cockburn of Ormistoun (Haddingtonshire) was an enthusiastic planter and improver, and thanks to the fact that official duty called him to reside in London during part of the year, and that he carefully directed his estate operations from there by letter, we have a remarkably interesting and full account of what was done, all the more so because the laird was critical and not easily pleased. In 1719 there was grown timber at Ormistoun, but these letters date from 1727 to 1744. Their greatest value to us is that the kinds of trees used are named, and it is this information alone that will be given at present. The list in alphabetical order is—Alder (called Aller), Apple, Ash, Aspen (called Quack Esp), Beech, Birch, Blackthorn, Cedar (not definitely stated to be planted), Cherry, Chestnut, Elder, Elm (English and small leaved mentioned specifically), Fir, Green Oak, Hazel, Holly, Hornbeam, Horse Chestnut, "Mapple," Mulberry (1740, the first known to be planted

in Scotland), Oak, "Orientall Plain," Pear, Pine, Plane (Sycamore), Privet, (called Privy), Quince, Rowan (called Rawen), Saugh, Silver Fir, Swedish Pine (Spruce), Sweet Chestnut, Thorn, Whitebeam (not named, but apparently this from the description given), Walnut, and Yew (5). Another writer states that Cockburn first planted the Acacia as a forest tree in the park at Ormistoun (9). Larch, Lime, Poplar, and Willow are not mentioned.

A brief reference to the planting of the Dawyck Estate, Peeblesshire, brings us to the first introduction of the Larch, and probably also of the Horse Chestnut in Scotland. Sir James Naesmyth (died 1779), second baronet of Posso (as the property was then called), was a botanist and pupil of Linnaeus, and did much planting, which included the first Larches in Scotland. In 1725 a number were planted at Dawyck, some of which still stand (7). This predates the Dunkeld and Blair Atholl trees (planted 1738), although the Dunkeld trees are generally called the "parent Larches." Two Horse Chestnuts near Dawyck House date probably from about 1730, and a Lime tree avenue from the same year, and a row of Silver Firs from 1735 (7). Horse Chestnuts were known there one hundred years earlier than the above-named. *The Dictionary of National Biography* makes a lapse in stating that Naesmyth was among the first to plant Birch and Silver Firs in Scotland.

APPENDIX.

Trees known in Scotland by the Year 1770.

Alphabetical Lists.

I.—NATIVE.

(a) *Glacial and Post-glacial Times.*

Alder.	Juniper
Ash (in South only).	Oak.
Birch (<i>Betula alba</i> and <i>nana</i>).	Scots Pine.
Elder.	Willows (various small-sized species).
Hawthorn.	
Hazel.	

(b) *Pre-chronological Times.*

Apple.	Holly.
Aspen.	Rowan (Mountain Ash).
Bird Cherry.	Sallow (Sauch).
Elm (Wych or Scots).	Willow (<i>Salix fragilis</i>).
Gean (Wild Cherry).	Yew.

II.—INTRODUCTIONS.

<i>Tree.</i>	<i>Date.</i>	<i>Locality.</i>
Abele, see Poplar, White, -	—	—
Acacia, - - - -	1727-44	Ormistoun.
„ Three-thorned, <i>Gleditsia triacanthus</i> (sic)	Before 1771	Armadales, Skye.
Arbor vitae, - - - -	„ 1683	Rosehaugh.
Arbutus, see Strawberry Tree	—	—
Ash, American White and Blue	1763	—
„ Flowering, <i>Fraxinus ornus</i>	1712	Bargaly.
Beech, - - - -	1540-60	Many places.
Bird Cherry, Carolina, -	1743	Hopetoun.
Birch, American Black, <i>Betula nigra</i>	1765	Ellick.
„ Paper, - - - -	1763	—
Buckthorn, - - - -	1677	Inveraray.
Cedar of Lebanon, - -	1683	Edinburgh.
„ - - - -	1693	Fordell, Inverkeithing
Chestnut, Horse, - -	1630	New Posso, now called Dawyck.
„ „ - - - -	1633	Moncrieffe.
„ „ - - - -	1683	Inveraray.
„ Spanish, - - - -	Middle ages	Various.
„ „ - - - -	1300 (estimated)	Finhaven.
Cypress, - - - -	Before 1683	Rosehaugh.
„ Deciduous, <i>Cupressus disticha</i>	1733	Loudoun.
Elm, English, - - - -	Early times	—

<i>Tree.</i>	<i>Date.</i>	<i>Locality.</i>
Fir, Balm of Gilead, <i>Pinus balsamea</i>	1732	Arbigland.
„ Pitch, - - -	Before 1683	Inveraray and Rosehaugh.
„ Silver, - - -	1650-80	Drumlanrig.
„ „ - - -	Before 1683	Inveraray and Rosehaugh.
Gleditschia, see Acacia, -	—	—
Hemlock, see Spruce, -	—	—
Hornbeam, - - -	Before 1683	Rosehaugh.
Judas Tree, <i>Cercis siliquastrum</i>	„ 1771	Armadales, Skye.
Laburnum, - - -	„ 1683	Rosehaugh.
„ Alpine, <i>Cytisus alpinum</i>	1705	Panmure.
Larch, American Black, -	1763	—
„ Common, - - -	1725	New Posso, now called Dawyck.
Laurel, Portugal, - - -	1695	Inveraray.
Lime, Common, - - -	1662	Glengairn.
„ „ - - -	1664	Taymouth.
„ „ - - -	1681	Inveraray and elsewhere.
Maple, Common, - - -	Before 1683	Inveraray and Rosehaugh.
„ Great, see Sycamore, -	—	—
„ Norway, <i>Acer platanoides</i>	1720-30	Tyninghame.
„ Snake-barked, - - -	1763	—
„ Sugar, <i>A. saccharinum</i>	1754	New Posso, now called Dawyck.
Mulberry, - - -	1740	Ormistoun (see also page 10, ante).
Nut, Hungarian, - - -	1744	Carmichael.
Oak, Evergreen, - - -	Before 1683	Rosehaugh.
„ Spanish, <i>Quercus Egilops</i>	1734	Newhailes.
Pear, Wild, - - -	Roman period	—
Pine, Long-leaved, - - -	1763	—

<i>Tree.</i>	<i>Date.</i>	<i>Locality.</i>
Pine, Weymouth, - -	1725	Dunkeld.
Plane, Oriental, - -	1710	Holyroodhouse.
„ „ - -	1718	Bute and Kelso.
„ „ - -	1734	Ormistoun.
Poplar, Balsam, - -	1770	Leith.
„ Black, - -	1682	Inveraray.
„ Lombardy, - -	1766	New Posso, now called Dawyck.
„ White (Abele), -	Before 1683	Inveraray and Rosehaugh.
Service (also Wild Service, see page 10, <i>ante</i>)	„ „	Rosehaugh.
“Silk Trees,” (see page 8, <i>ante</i>)	„ 1629	Galashiels.
Spruce, White Newfound-land, <i>Pinus canadensis</i>	1759	New Posso, now called Dawyck.
„ see Fir, - -	—	—
Strawberry Tree, - -	Before 1683	Rosehaugh.
Sycamore (<i>Scotice</i> , Plane), -	15th century	—
Tulip Tree, <i>Liriodendron tulipifera</i>	1735	Lochnell.
„ - - -	1740	Hopetoun.
Walnut, - - -	Middle ages	—
Whitebeam, - - -	Roman period	Melrose.
Willow, <i>Amerina</i> , <i>Salix amerina</i>	1746	Meilerstain.
„ Tinebark, <i>S. phlor-agma</i> , -	1739	Newhailes.
„ White, - -	1678	Prestonfield.

NOTE.—List No. II. includes the trees named in Walker's book (27), re-arranged in alphabetical order. The fuller information now available has, in some entries, led to his dates being superseded by earlier ones. His names, both English and scientific (when he gave such), are retained, and no other scientific names have been inserted in the list. The other trees are from the authorities named below.

Many of the dates should be qualified by the word “about,” and this must be taken as understood.

For authority for the Rosehaugh items, see page 10, *ante*.

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Night Notes of some Birds.

By JOHN ROBERTSON.

[Read 4th October, 1910.]

THE ornithologist who lives in a great city like Glasgow, or in its immediate vicinity, has few opportunities of observing the phenomenon of migration or similar bird movements which take place after dark, especially in our spring and autumn months. To the dweller in the country or at the coast these opportunities occur much more frequently. I have never been able to say I heard any great movement going on, only the notes of what were evidently small parties or individuals passing. Whether they were on migration, merely passing from coast to coast, or shifting their feeding grounds, I have only in a few instances been able to decide. That considerable movement often takes place over Glasgow and neighbourhood the following notes, I think, will show. In a number of instances, however, I have been unable to determine the species, the call-notes being unfamiliar or not sufficiently distinct for identification.

Among the thrushes I have heard the Song-thrush, Fieldfare, Redwing, and Blackbird call as they passed over after dark, usually in autumn. The SONG-THRUSH (*Turdus musicus*) and BLACKBIRD (*T. merula*) I have heard frequently, the FIELDFARE (*T. pilaris*) only on two or three occasions, but the REDWING (*T. iliacus*) most abundantly. The feature of our dark, still October nights is the note of the Redwing as it passes overhead on its southern journey from Northern and Eastern Europe. There is little doubt that the Redwings are on migration when emitting these call-notes, as they are seldom heard at night after October, though the bird is, without exception, our commonest winter visitor. It is rarely heard in spring, which seems to show

that the birds either start their northward flight in the day time or return by a different route from that traversed in the autumn.

SEDGE-WARBLER (*Acrocephalus phragmitis*).—This species often sings all through the summer night. A still, close, though not necessarily warm, night seems to draw out their vocal powers, and it is well known that some noise near their haunts, or a stone thrown among the bushes they inhabit, will set them agoing if they should happen to be silent.

HEDGE-SPARROW (*Accentor modularis*).—I have only once heard this species at night. One evening in spring, about ten o'clock, long after daylight had completely gone, I heard a hedge-sparrow burst into full song.

The **YELLOW-BUNTING** (*Emberiza citrinella*) I have heard once or twice passing over, but I am inclined to think that the birds had been disturbed, and were merely changing their roosting place.

STARLING (*Sturnus vulgaris*).—This species collects in large numbers in plantations, about rookeries, and even old ruins, after the young are fledged. These congregations sing and chatter, especially in moonlight, all night long. The song on these occasions seems to lack the robustness characteristic of it during daylight, as if the birds were only half-awake. I have heard them singing in this manner as late as the first week of October, at Rothesay Castle.

The **SKY-LARK** (*Alauda arvensis*) is often heard passing over, most frequently when there is moonlight.

The **CUCKOO** (*Cuculus canorus*) though well known to call at times during the night, I have rarely heard do so—only twice or thrice, I think.

OWLS.—The call-notes of the owls are very inadequately described in the text-books on birds. The **TAWNY OWL** (*Syrnium aluco*) is often heard in the vicinity of Glasgow, and I have heard the **BARN OWL** (*Strix flammea*) a few times—both species about their regular haunts. The **LONG-EARED OWL** (*Asio otus*) I often hear passing over, emitting a note like *whit whit*.

The hoarse *crank* of the **HERON** (*Ardea cinerea*) I have heard on dark nights, but not often.

GEESE.—Once or twice I have heard Geese passing over in the moonlight, but I do not know to what species they belonged.

Among ducks I have heard the MALLARD (*Anas boscas*) pass but rarely, though the clear call of the WIGEON (*Mareca penelope*) is not an infrequent sound at night.

Of course I have also heard these two species, as well as the TEAL (*Nettion crecca*) when disturbed from some feeding or resting ground.

I am pretty certain I have heard the rattle of the wings of the GOLDENEYE (*Clangula glaucion*), but never its note.

RING DOVE (*Columba palumbus*).—I have now and again heard the Wood Pigeon cooing on mild nights, but in a more subdued manner than through the day.

The PHEASANT (*Phasianus colchicus*) often gives a short crow, and the PARTRIDGE (*Perdix cinerea*) its usual call note at least early in the night.

The WATER-HEN (*Gallinula chloropus*) is often heard passing, but the COOT (*Fulica atra*) is seldom heard.

GOLDEN-PLOVER (*Charadrius pluvialis*).—One of the most frequently heard notes is that of the Golden-plover, often on very dark nights, and the note always conveys the impression that the birds are in a desperate hurry.

LAPWING (*Vanellus cristatus*).—The Lapwing is usually heard calling about the fields. On moonlight nights, especially in spring, the birds seem to be very active. I have noticed in spring, when the moon was on the wane and the first hour or two of the evening was dark, that the Lapwings were silent, but as the moon rose they began to get noisy, until they were calling pretty much as in the day time.

OYSTER-CATCHER (*Haematopus ostralegus*).—After the Golden Plover and Curlew, this species is perhaps the one most often heard passing to the south of Glasgow.

WOODCOCK (*Scolopax rusticula*).—I have heard in Bute passing near my window with its curious croaking note. These, of course, were breeding birds and certainly not on passage.

COMMON SNIPE (*Gallinago caelestis*).—The *skape-skape* note of the Snipe is frequently heard at night as the birds are passing over. At their nesting haunts in spring, the "drumming" sound which they produce is often continued well into the night, but this autumn, on 14th August, I heard a Snipe drumming at Muirend at 9 p.m., when it was quite dark.

DUNLIN (*Tringa alpina*).—I have heard passing on three occasions only. One of these times I heard the birds coming from the north, passing overhead, and go beyond hearing to the south. The note never ceased. Before one bird finished another had taken it up, and so on. It seemed to be a true migratory movement.

COMMON SANDPIPER (*Totanus hypoleucus*).—This species is often heard passing all the season it is here.

REDSHANK (*T. calidris*).—Frequently passes over on dark still nights.

BAR-TAILED GODWIT (*Limosa lapponica*).—I believe I have heard this species pass emitting a note, *tit tit*, but as the Long-eared Owl has a note very similar I am not quite sure of my identification.

CURLEW (*Numenius arquata*).—Heard passing over just about as frequently as the Golden Plover.

BLACK-HEADED GULL (*Larus ridibundus*).—I have heard it only a very few times.

KITTIWAKE (*Rissa tridactyla*).—I once heard in April what seemed to be a flock of Kittiwakes passing.

Some Additions to the Fresh-water Algæ of the Clyde Area.

By GEORGE LUNAM.

[Read 4th October, 1910.]

THE Clyde Area is undoubtedly a rich field for the student of fresh-water algæ. Within comparatively easy reach of Glasgow are numerous lakes, ponds, tracts of more or less marshy ground, and humid glens, all harbouring a rich algal flora. The greatest difficulty to be met is that of identification, this being due to the lack of an exhaustive systematic work in English bearing on the

group, and until this is remedied the workers in this entrancing field will be but few.

The following list consists mainly of species not given in the *Fauna and Flora of the Clyde Area* (1901), and which have not, so far as known, been noted since that date. A few are records from new districts. W. West, Esq., F.L.S., kindly named or verified all the species (except *Hormospora mutabilis* which was unfortunately omitted from the batch sent to him, but of which, I think, there can be no doubt). The list contains representatives from most of the larger families, and only those who have attempted naming these small forms can realise our indebtedness to Mr. West; he added all the desmids except *Desmidiium Swartzii*. In all cases the district or place from which the specimen submitted to Mr. West was obtained is given first in the list.

Edogonium undulatum (Bréb.) A.Br.—Loch Ardinning. A very characteristic species; very rare, only a few filaments being found, though careful search was made during two seasons.

Coleochaete scutata, Bréb.—Loch Ardinning, Loch Bardowie, Loch Libo, Loch Doon, Glen Falloch, Johnstone Loch. Certainly our commonest species. In 1901 list.

C. soluta, Pringsh. Loch Ardinning and Johnstone Loch.

C. nitellarum, Jost.—Bute. Under the cuticle of a species of nitella collected by Mr. Garry and myself. Mr. West had not a description of the species at hand, but thinks the name probably correct. "Spermocarps" were abundant. I can find no trace of British records for this species.

C. pulvinata, A.Br.—Loch Ardinning. The specimen showed numerous "spermocarps."

Ulothrix subtilis, Kütz. Bute.

Hormospora ordinata, West and G. S. West.—Loch Ardinning. Somewhat rare.

H. mutabilis, Bréb.—Bute, in marshy ground.

Microthamnion Kützingerianum, Näg. Loch Ardinning, Glen Falloch, and Loch Libo. Mr. Robert Garry recorded this species from Ailsa Craig (1909).

Zygnema anomalum (Hass.) Cooke.—Bute. In marshy ground only a few feet above sea level. Lateral and scalariform conjugation.

Spirogyra nitida (Dillw.) Link.—Bute. A new station for the species.

Pleurotaenium Ehrenbergii (Bréb.) De Bary.—Loch Ardinning.

Euastrum bidentatum, Næg.—Loch Ardinning.

Cosmarium reniforme (Ralfs.), Arch.—Loch Ardinning.

C. Meneghinii, Bréb., *f. octangularis*.—Loch Ardinning.

C. quadratum, Ralfs.—Bute.

Staurastrum dejectum, Bréb.—Bute.

Desmidiium Swartzii, Ag.—Bute. Seems fairly well distributed.

Chlorochytrium lemnae, Cohn.—Possil and Johnstone Loch.

Endophytic in *Lemna trisulca*.

Radiococcus nimbatus (De Wild.), Schm.—Glen Falloch.

Protoderma viride, Kütz.—Glen Falloch and Loch Ardinning.

Scenedesmus obliquus (Turp.), Kütz.—Glen Falloch. This species = *S. acutus*. (Mr. West).

Ineffigiata neglecta, West and G. S. West.—Loch Ardinning, &c. Common. Mr. West says this is now regarded as a form of *Botryococcus Braunii*.

Palmodactylon varium, Næg.—Lochwinnoch, Loch Ardinning, Inverkip, Glen Falloch. The Lochwinnoch specimens had a rather firm brownish outer layer.

Chlorobotrys regularis (West), Bohl.—Lochwinnoch.

Stigonema turfaceum.—Glen Falloch.

Hapalosiphon Hibernicus, West and G. S. West.—Glen Falloch.

Scytonema mirabile (Dillw.), Thur.—Glen Falloch.

Nostoc macrosporum, Menegh.—Glen Falloch. On wet rock faces. A very pretty species.

N. microscopicum, Carm.—Bute.

Glæotrichia Pisum, Thur.—Glen Falloch and Portincaple.

Glæocapsa Ralfsiana (Hass.) Kütz.—Glen Falloch.

Chroococcus turgidus (Kütz.) Næg.—Glen Falloch. Mr. West pointed out that the specimens of this species were "extra large."

Notes on Alien Plants found near Paisley.

By D. FERGUSON.

[Read 26th October, 1910.]

DURING the past summer the strange flora of a piece of waste land to the south of Paisley engaged the attention of a small section of the Paisley Naturalists' Society. Repeated visits to this waste land and subsequent investigation revealed the fact that the plant life found within its borders was of a very unusual character, and as a result of this discovery it was deemed advisable to submit specimens of most of the plants to P. Ewing, Esq., F.L.S., with a view to having their identification verified, and also for the purpose of having them recorded for future reference.

This waste land, which is about an eighth of an acre in area, occupies part of the site of an old sandstone quarry, and has been slowly formed by the dumping of much heterogeneous material into the excavation caused by former quarrying. Road scrapings, garden refuse, broken bricks, lime, ashes, soot, and a curious kind of soil rather difficult to describe, have all contributed their quota to the levelling up of the ground. This curious kind of soil was eventually traced back to a local brewery, and proved to be the sweepings of the kilns mixed with various waste products.

Many of the plants, more especially such as are annuals, must have grown, seeded, and reproduced themselves in their present situations, as the great majority of them were discovered on the first formed parts of the ground to which there have been no additions for a year or two at least. These will in all probability reappear again, as with few exceptions they have been able to set seed. A few on the other hand will not likely be seen again, as the only plants of their kind were collected.

Ranunculus arvensis, L., and *Delphinium Ajacis*, L. Only three plants of the former and but one of the latter were found.

Glaucium corniculatum, Curt., was the only poppy found, and that a badly grown one.

Cruciferous plants included *Sisymbrium Sophia*, L., *Erysimum repandum*, L., *Erysimum cheiranthoides*, L., *Conringia orientalis*, Dum., *Camelina sativa*, Crantz, *C. sativa*, Crantz, var. *fetida* (Fr.), *Lepidium ruderales*, L., and *Thlaspi arvense*, L. Only one plant of *Sisymbrium Sophia*, L., and but a few of *Lepidium ruderales*, L., were found. *Conringia orientalis*, Dum., which makes sporadic appearances in this district, and *Erysimum cheiranthoides*, L., were frequent, but the latter was generally much dwarfed, while *E. repandum*, L., was found in all parts of the ground, often reaching a height of three feet. This plant was also collected this summer on the banks of the White Cart, on the occasion of an evening excursion of the Paisley Naturalists' Society. *Camelina sativa*, Crantz, and its var. *fetida* (Fr.), and *Thlaspi arvense*, L., were very abundant, and seeded well. Seedlings of the last-named plant are at this time (Oct. 7th) springing up all over the ground. The majority of the above plants are practically unknown as established plants of this neighbourhood. *Reseda lutea*, L., was in splendid condition. It appears rather frequently in the Paisley district.

Silene noctiflora, L., and *Saponaria Vaccaria*, L., were collected. The former is unknown as a Renfrewshire plant, but the latter has made frequent appearances in this district during the past few years. It was reported from five different localities in the neighbourhood of Paisley during the summer now ended, and in four of these cases its occurrence was verified. A very poor specimen of *Linum angustifolium*, Huds., the only one to be obtained, was preserved.

Malva rotundifolia, L., and *M. parviflora*, L., the latter abundant, the former less so, typical plants of waste places, flowered freely from June till the end of September.

A goodly number of rare leguminous plants were collected. Included in the collection are *Medicago hispida*, Gaertn., var. *denticulata*, Willd., *Melilotus officinalis*, Lam., *M. alba*, Desr., *Trifolium arvense*, L., *Vicia lutea*, L., *Vicia bithynica*, L., and *Lathyrus Aphaca*, L.

Three of the most interesting plants were *Caucalis daucoides*, L., *C. latifolia*, L., and *Bupleurum rotundifolium*, L. One

specimen only of the first and third and about half-a-dozen of the second were observed.

Several plants of the Order Compositae were considered worthy of preservation, namely, *Anthemis Cotula*, L., *Cirsium arvense*, Scop., var. *setosum*, C. A. Mey., *f. argenteum* (Buch.-White), *Cichorium Intybus*, L., *Ambrosia trifida*, L., and another plant which may possibly prove to be *Sanvitalia*. *Anthemis Cotula*, L., was plentifully distributed all over the ground. *Cirsium arvense*, Scop. var. *setosum*, C. A. Mey., *f. argenteum* (Buch.-White), was common. The leaves of this plant are almost entire, in some cases quite so, not decurrent, and hardly prickly at all.

Two or three plants of *Lysimachia vulgaris*, L., grew concealed by tall nettles, but did not ripen their seeds. In one part of the coup *Convolvulus arvensis*, L., grew very luxuriantly, choking all the vegetation in that part.

Datura Stramonium, L., was represented by half-a-dozen plants, none of which flowered. After the flower buds had reached a certain stage of maturity they simply withered and fell off.

Lappula echinata, Gilib., was one of the commonest plants of the ground in early summer. In flower it strikingly resembles *Myosotis arvensis*, Hoffm., but may be easily distinguished by its muricated fruits.

A rare labiate was discovered in *Satureia Acinos*, Scheele. Although this plant appears in Henedy's *Clydesdale Flora*, it is certainly as little known in this district as any of the strange plants included in the collection.

Another rare plant discovered was *Amaranthus retroflexus*, L., of which there were about six specimens.

Phalaris canariensis, L., *Setaria viridis*, Beauv., and *Avena fatua*, L., complete the collection. The first is not uncommon in the Paisley district, the second, characterized by the rough bristles at the base of the spikelets, is quite unknown in this neighbourhood, while the third is also unrecorded locally.

My special thanks are due to Mr. Ewing, who kindly supplied me with much valuable information which proved very helpful in the identification of many of the plants. He has also taken the trouble to examine a considerable number of the plants in a more or less fresh condition, as well as the whole collection of dried plants.

On some Flowering-plants Exhibited.

By P. EWING, F.L.S.

[Read 4th October, 1910.]

Draba incana, L., var. *confusa* (Ehrh.), from Beinn Heasgarnich. In the case of this variety, the plant is branched from the base. The common form on the Breadalbane range is the *f. stricta*, Hartm., with straight, unbranched stem; but other forms are met with, such as *f. gracilis*, in which the plant is often branched with very thin branches, sometimes almost all its length; then the pods may be smooth (*f. legitima* (Ledeb.)) or hairy (*f. hebecarph*, Lindbl.).

Erophila verna (L.), Meyer.—Islay, T. F. Gilmour. This does not seem to have been properly recorded, although it appears in the *Glasgow Catalogue*.

Sedum villosum, Linn.—Britannia Flow, Lanark. Rather a rare plant in Lanarkshire. Recorded from the Clyde Isles, but not from Cantyre or any of the Western Isles.

Scandix Pecten-veneris, L.—Stornoway, Outer Hebrides. On a thatched roof near the shore. This is the first record from any of the Western Islands, and even on the Western Mainland it is a rare plant.

Levisticum officinale, Koch.—Near cottages between Kirkwall and Stromness. This plant is included in Druce's list. It seems to be a native of Northern Italy, and is used as a medicine for cattle.

Primula scotica, Hook.—Near Wick. Only found in three vice-counties in Britain, but in this station, at least, very plentiful.

Veronica hederifolia, L.—Skye. New record.

Utricularia intermedia, Hayne. — In Buchanan-White's *Flora of Perthshire* this plant is said to ascend to 1,800 feet in Breadalbane. This specimen was taken from a marsh between Ben Lawers and Meall Garbh, at an altitude of 3,200 feet. As

it never flowers, I have not recorded it for this altitude, and for the same reason I have never recorded what I believe to be *Callitriche hamulata*, Kutz., which grows in a pool a little above this marsh, and would be at least 500 feet higher than the record given in the above Flora. Strange to say, *Triglochin palustre*, L., is fairly common in this marsh also, and is found even higher, yet the same authority only gives 2,800 feet as its highest point in Breadalbane.

Plantago Coronopus, L., var. *maritima*, G. & G.

Juncus tenuis. Willd.—Near Killin. There are two stations for this plant near Killin. Two years ago the plants at one of the stations were fairly numerous, but now all the larger plants have been cleaned out. There are still a considerable number of small plants, and with a little rest the station may improve. It is worthy of remark that in Hooker's *Students' Flora* (1878) it is stated that this is one of Don's "reputed discoveries," and now this is the twenty-fourth British county or vice-county in which it has been found. It seems to occur as a native in Northern France, Belgium, Batavia, Germany, and Bohemia; so there is no reason why it should not also be a native of this country. It is difficult to explain how it has been so long overlooked.

Carex Halleri, Gunn.—Beinn Heasgarnich. One of our rare British Carices.

Notes.

Ruff (*Machetes pugnax*) in Lanarkshire.—I am indebted to Mr. Matthew T. Buchanan for giving me the opportunity of examining a Ruff, which he shot out of Golden Plover at Gad Loch, near Lenzie, on 1st October, 1910.—John Paterson.

Increase in the numbers of the Jay (*Garrulus glandarius*) on Inchtavannach, Loch Lomond.—During the spring and summer of 1907 we did not observe a single Jay on Inchtavannach. In 1908 our house-boats were stationed at Ardlui, and consequently we had no opportunity of visiting Inchtavannach. In the spring of 1909 we returned to our old anchorage in the straits between Inchtavannach and Inchconnachan, and we were surprised to find that the Jay had become comparatively common.

This year (1910) the abundance of Jays was undoubtedly the feature of the island. Their harsh cries could be heard on all sides, and we estimate that at least three pairs successfully reared broods within a few hundred yards of the house-boats. We attribute the increase of Jays on Inchtavannach to the thinning of the larch trees during 1907-8. This has admitted light and air, and the once dark and gloomy solitudes of the island are now teeming with animal and plant life.—K. & R. M. Buchanan.

Common Guillemot (*Uria troile*) in Glasgow Harbour.—

On 4th September I saw a Common Guillemot on the Clyde, just below Finnieston Ferry. This is the first time I have observed this species in Glasgow Harbour.—W. R. Baxter.

Common Guillemot (*Uria troile*) inland in Renfrewshire.

—On the Ryat Dam (E. Renfrew) on 2nd October, 1910, I saw a Common Guillemot, a species which is new to East Renfrew, although this district has been pretty systematically worked for the past twenty years. On the preceding day Mr. Hugh W. Wilson was surprised to see one from the train in a park near Milliken Park Station. Another was got on the Greenwater, a tributary of the Gryffe, in the second week of October, as Mr. W. L. Walker, Kilmacolm, informed Mr. T. Thornton M'Keith, who passed on the information to me. That so many should turn up in a few weeks, in localities where they are quite unknown, is as puzzling as it is unprecedented. The weather, as we have all reason to remember, was, during September and October, only exceptional in its fineness.—John Paterson.

Experience with a Storm-Petrel (*Procellaria pelagica*) near Portree.—

On 29th August an interesting incident took place on the s.s. "Claymore" when nearing Portree, south bound. It was about midnight, and the bright glare of the electric lights, shut in by a dense fog around, made the deck feel like a closed room. While standing chatting under the awnings astern, a bird flew in from the sea and made, like a moth, for one of the lamps. As it fluttered down the side of the deck cabins I caught it, and found it to be a Storm-Petrel. After the few passengers on deck had satisfied their curiosity about it, it was proposed to keep it till next morning to allow the other passengers to become

acquainted with it. This, however, was not to the taste of one superstitious individual, who asserted that the petrel was a bird of evil omen, and that it would be very unlucky to keep it on board. He was so much in earnest that I handed him the bird, which he took at once to the side of the vessel and threw out into the darkness. His relief did not last long, for a minute afterwards the bird came fluttering aboard again and was once more caught. I suggested that he should try the other side of the steamer. He did so, but with the same result, as in a minute or so afterwards it flew at the old place. Much to the disgust of the superstitious one, I got a cardboard box in which I kept it till after breakfast next morning, when most of the other passengers made their first acquaintance with the Storm-Petrel. It was delightful to see the rapid movement from the steamer when the bird was set free. I suppose the nesting season will account for the presence so near land of this ocean-loving species. —Alex. Ross.

A notable Sycamore.—After the publication of my paper "On the Sycamores in the Clyde Drainage Area" (*Glasgow Naturalist*, vol. ii., pp. 112-26), I heard of another notable example of the species at Kinkell, Stirlingshire, which I have since visited. It measures 16 feet 1 inch in girth of trunk at 5 feet 2 inches; height, 80 feet. I should have drawn attention in my paper to a reproduction from a photograph of the tree at Loganswraes (Renfrew), in the *Transactions* of this Society, vol. iv. (N.S.), p. 252, and another of the tree at Auchans (Ayr), in vol. vi. (N.S.), p. 382.—John Renwick.

Mealy Redpole (*Linota linaria*) in Ayr, Lanark, and Renfrew.—On 12th November, 1910, Mr. Robert Kennedy, of Beith, showed me two Mealy Redpoles which had been "limed" on 5th November, 1910, together with other six of the same species. Mr. Kennedy informed me that a flock of at least forty Mealy and Lesser Redpoles had been frequenting a fir plantation behind Speir's School, Beith, for about a fortnight, and it was quite close to this place where the Mealy Redpoles were caught.

At Possil Marsh, on 13th November, some bird catchers told me that they had caught twelve Mealy Redpoles and a Siskin

(*Carduelis spinus*) there, on 30th October, 1910, and Mr. T. W. Wilson tells me that Mr. Alston has recently been seeing Mealy Redpoles near his house at Darvel, North Ayrshire.

On 19th November, 1910, two were seen by Mr. John Robertson at Giffnock, and on 20th, in the same region, he saw one early in the day, and later, together, we saw another. This is an addition to the birds of East Renfrew.

From the above it would appear that there has been a considerable influx of this bird, and Mr. Gurney's remark (*in litt.* to Mr. John Paterson, 16th November, 1910), that "the chief migration that October has brought us has consisted of Mealy Redpoles and Great Tits," although referring to Norfolk, may be read in this connection.

There is little information regarding this bird in the Clyde Area, a pair shot at Carmichael, 7th December, 1900, and one caught at Beith, November, 1904, being the only recent occurrences I know of.—Robert W. S. Wilson.

Flamingo (*Phœnicopterus roseus*) in Dumbartonshire.—I am indebted to Messrs. Matt. Galloway and Harry G. Cumming, for the information promptly sent to me, that on the 9th of October, on the estuary of the Clyde at Cardross, they saw a Flamingo. Subsequent inquiries showed that this bird had been seen by many people between Cardross and Helensburgh for a month previous, and it was again seen by Mr. Cumming and his brother on the 23rd, when, under unfavourable conditions, they tried, but unsuccessfully, to photograph it. Rumour has been busy all through about its supposed source of origin and latterly about its ultimate fate, but nothing sufficiently tangible has yet emerged to justify its inclusion in this note. The occurrences of single birds in Kent, Hampshire, Staffordshire, and Merionethshire are apparently admitted by Saunders in his Manual as probably genuine migrants, while a fourth in the Isle of Sheppey is open to suspicion. Since Saunders's narrative was published it appears from *British Birds* (vol. ii., page 24) that half-a-dozen occurred between 1902 and 1906 on the Wash (1), in Norfolk (4), and in Kent (1), but Messrs. Witherby and Ticehurst enclose them in square brackets, so many having been turned down at Woburn (and possibly some elsewhere) with only cut wings. All interested

in scientific ornithology will agree with the emphatic protest that the gentlemen last named make against the practice of turning out birds which, like the Flamingo, may reach this country during the migration period. But for this reprehensible practice we in "Clyde" would either not have had this Dumbartonshire Flamingo to puzzle over, or we would have been able to include it in the Clyde list, without the square brackets which indicate a doubt as to its being a genuine visitor.—John Paterson.

A Beetle new to Science from Possil Marsh and Frankfield Loch.—At the meeting of the Society on 25th October, 1910, Mr. Anderson Fergusson exhibited specimens of *Galerucella fergussoni*, Fowler, a species of coleoptera new to science, described by Rev. W. W. Fowler, M.A., F.L.S., in the *Entomologist's Monthly Magazine* (vol. xxi., N.S., 228), from examples taken at Possil Marsh and Frankfield Loch. It was pointed out that the species was not strictly new to Clyde, as it had been recorded in the British Association List of Coleoptera as a black variety of *Galerucella nymphaeæ*, L., on three specimens found at Possil Marsh, in 1900, by Mr. A. Adie Dalglish, to whom accordingly was due the honour of having first taken the new species.

The Arrival of Summer Visitors in Scotland and the North of England.—Now that there have appeared (1) the details of the "Report on Scottish Ornithology in 1909," in the *Annals of Scottish Natural History* for October, 1910, and (2) vol. xxvi. of the *Bulletin of the British Ornithologists' Club*, containing *inter alia* the "Report on the Immigrations of Summer Residents in the Spring of 1909," it is possible to make a comparison between the arrivals of summer birds in "Clyde" for 1909, as recorded in the *Glasgow Naturalist* (vol. i., pp. 70-73), and the arrivals for Scotland and the North of England. As regards the Scottish mainland, the Whinchat was seen a day earlier in Fife than at Possil Marsh, the Blackcap and the Wood-Warbler were recorded from the east coast, but not from "Clyde," and the Sand-Martin was seen at Dirleton a week before it was observed in "Clyde." The following species were

noted as arriving in "Clyde" earlier than in other Scottish localities:—Ring-Ouzel, Wheatear, Redstart, Whitethroat, Garden-Warbler, Chiffchaff, Willow-Warbler, Sedge-Warbler, Grasshopper-Warbler, White Wagtail, Yellow Wagtail, Tree-Pipit, Spotted Flycatcher, Swallow, House-Martin, Sand-Martin, Swift, Cuckoo, Corncrake, Common Sandpiper. Thus, the first records of appearance of four species fall to the rest of Scotland, and twenty to "Clyde." According to the British Ornithologists' Club Report, above quoted, only three species, viz., the White Wagtail, Corncrake, and Common Sandpiper, arrive *solely* on the western half of the south coast of England. From this, one would conclude that we do not owe very much to our geographical position, and we are consequently forced back upon the explanation that "Clyde" observers are indebted to their numbers, organisation, enthusiasm, and experience for the results which appear so remarkable. Parenthetically, it illustrates the difficulty in getting at the truth, for, without this body of evidence from one district as a corrective, very erroneous opinions might, and indeed do, obtain regarding the appearance of our summer visitors.

A comparison with the dates collected by the British Ornithologists' Club, so far as this relates to the Counties of Durham, Northumberland, Westmoreland, Cumberland, and the Isle of Man, gives results equally striking. The following species were seen (in 1909) first in the English region just referred to:—Ring-Ouzel, Whitethroat, Garden-Warbler, Grasshopper-Warbler, Chiffchaff, Willow-Warbler, White Wagtail, Yellow Wagtail, Sand-Martin, Swift, Cuckoo—eleven species in all. The following species were seen in "Clyde" before being seen in the English region above quoted:—Wheatear, Whinchat, Redstart, Sedge-Warbler, Tree-Pipit, Spotted Flycatcher, Swallow, House-Martin, Corncrake, Common Sandpiper—ten species in all. The difference in some cases is striking, as in the case of the Swallow, which was seen on the same date (8th April) in the Counties of Ayr, Dumbarton, and Lanark, before it was seen in any of the English counties named or the Isle of Man. The "Clyde" dates of arrival falsify the conclusions of the compilers of the English report about species having "extended as far north as" so and so, on dates later than those on which we know the birds to have extended considerably *farther* north.—John Paterson.

Reviews.

The Home-Life of the Spoonbill, the Stork, and Some Herons.—By Bentley Beetham, F.Z.S., with thirty-two mounted plates. Witherby & Co., London. 5s. net. Author and publisher are to be congratulated on a production which leaves little to be desired. We have read the modest narrative of the author with pleasure and admiration—it is a story for old and for young. Although the reproduction of photographs of nests, &c., often “hard,” on heavily-loaded and highly-glazed paper, may be only comparatively a thing of yesterday, we seem to have been nauseated with it time out of mind. In the present volume the tone of the prints and the mounting come as a welcome relief.

The Birds of Dumfriesshire.—By Hugh S. Gladstone. Witherby & Co., London.

While waiting for *any* list of the Birds of Scotland, and for a more serious contribution to the Birds of Forth than Mr. Eagle-Clarke’s sketch-paper in Pollock’s *Dictionary of the Forth*, we are glad to extend a welcome to Mr. Gladstone’s *Birds of Dumfriesshire*. Through Mr. Service we had learned a good deal about the birds of the Solway region, and it is pleasant to see that in carrying out his task, Mr. Gladstone has had Mr. Service’s hearty co-operation, which generous assistance the author fully acknowledges.

Excluding ten introduced species, and twenty-nine of doubtful occurrence, there remain, according to Mr. Gladstone’s enumeration, 218 species to make up the Birds of Dumfriesshire. The total is a handsome one, and no doubt owes something to the vigilance of ornithologists like the late Sir William Jardine, Mr. Robert Service, and the author.

The extent to which a local work like the present should be a general history of birds must depend on the personal equation. Writing with one eye on a portion of his public, Mr. Gladstone has given an idea of the range of each species. We think the space devoted to this would have been more profitably spent in giving fuller local details—not of the history of the occurrence of the species, because in all cases this is fully done—but in indicating the kind of ground occupied, the nesting habits, &c. This strikes us in the first species dealt with, the Mistle-Thrush,

but finding the same lack of detail in these particulars in the species covered by the next few pages, we soon learn what not to look for. We believe it is difficult to lay out space to please everyone, but we could understand a complaint of half-a-dozen lines only being given to the Whinchat, a common bird with which the author is no doubt familiar, while the Golden-eye, which is not so common, and about which the author knows little, gets over a couple of pages. Some of the parts of the work, *e.g.*, the notices of the Great Spotted Woodpecker, the disentangling of the Solway Crossbills, the voluminous statistical information about the Rook, &c., are substantial enough in themselves, to secure Mr. Gladstone's place among Scottish ornithologists.

We can only notice here a few points of difference, &c., in Mr. Gladstone's experience and ours. Regarding the Whinchat, it is not at all characteristic of "localities where there are copses." Railway banks, waste-ground of any kind, the straggling hedges at the tops of the valleys on the borders of the cultivated land, are more its associations here. We are not satisfied with the new evidence of the Lesser Whitethroat nesting in Solway, and are confirmed in our opinion because satisfactory evidence has not been produced for the past twenty years from any part of Scotland. This is not because we are not open to conviction. In this matter we have been unable to add anything to what we have inherited, an inheritance which, by the way, there is perhaps good reason for our having renounced. The Blackcap and the Garden Warbler, so far as their relative numbers are concerned, seem to present some doubt in Solway, with some evidence in favour of the preponderance of the former. In "Clyde" the Garden Warbler hardly ever fails us where we expect to find it, while it is, in many even likely situations, a pleasant surprise to get the Blackcap, though in certain other places, as in the orchard country of Lanark, it is more constant. In our experience most Dippers have their eggs laid by the end of March—Mr. Gladstone says the first fortnight in April. As a nesting species in "Clyde," the Coal-tit is seldom found away from conifers, and in pine woods outnumbered both the Great and Blue Tits combined, but in deciduous woods, and away from woods altogether, the two latter then hold the field, few if any Coal-tits being found. The usual nesting place of the Jackdaw

in "Clyde" is a hole of some kind, *not* in young fir trees. Might the Ecclefechan (1858) Stock-dove not be a domestic pigeon which had become feral? See the remarks quoted by Mr. Gladstone under Rock-dove (page 310).

The Capercaillie makes a poor figure as a Dumfriesshire bird, no unquestionable record being given. The Ruff seems to have been regarded by Sir William Jardine, 70 years ago, much as we regard it round Glasgow to-day, although the author thinks it an irregular visitor at fairly long intervals. Perhaps the egg-collector has a little more laid on him, in the matter of its disappearance as a breeding species in England, than the facts warrant. It appears from Montagu's narrative, that dozens and dozens of these birds were caught annually, for generations, in the breeding season for the table. In these circumstances, where were the young birds to come from to replenish the stock? The Redshank is reported to have become very much more common in the last few decades in Dumfries, but though something of the same kind is stated to have happened in one or two "Clyde" localities, we cannot speak to any decided change in its numbers on Mearns and Eaglesham Moors in summer in the past twenty-six years. The Spotted Redshank is not so difficult to distinguish from the Common Redshank as the author thinks, as its plumage, size, length of bill and legs, the absence of the white margins to the wings, and its sharp "flying" note, all aid in its detection. The Greenshank records in Dumfries run from August to January, but in "Clyde" we know it from July till April, and with us it seems to prefer fresh water to salt. The Curlew does not seem to breed close to the shore in Dumfriesshire. With a greater variety of physical range in "Clyde," it is perhaps not surprising that it does so with us.

In a short notice it seems more profitable to refer to points of difference in our experience or points of view. We particularly regret lack of space to draw attention to the changes in the avifauna of the county recorded by Mr. Gladstone, as they make a remarkable catalogue. With the material at his hand we do not think the author could have done more than he has done. The *Birds of Dumfriesshire* is a handsome volume, excellently printed. Lessening the number and heightening the quality of the illustrations would have been an advantage in a book of this class.—J. R.—J. P.

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[February, 1911.]

The Birds of East Renfrewshire.

By JOHN ROBERTSON.

[Read 31st January, 1911.]

THE area to which the following notes relate is the present political division of East Renfrewshire, which embraces the Parishes of Eaglesham, Mearns, Eastwood, Cathcart, and part of the Parish of Govan. The extent of the district is not great, being roughly twelve miles north and south and seven at the broadest part, although the average breadth is much less. There are no striking physical features throughout the area, but it is sufficiently varied in aspect to be quite free from monotony. The greatest elevation (1,230 feet) is attained in the south-east corner of Eaglesham. The slope of the district is to the north. In the uplands of Eaglesham and Mearns there are extensive moorlands, mostly grassy, but with considerable stretches of heather, particularly in Eaglesham. In these two parishes there are many lochs and reservoirs very attractive to water-fowl and waders. Cathcart and Eastwood Parishes, with little elevation, are largely cultivated, with a fair share of woodlands, none, however, of great extent. The White Cart and its tributary, the Earn, are the principal streams. During the past quarter of a century Glasgow has steadily encroached on the northern part of our area, and many square miles are now covered by its streets. This, of course, has dispossessed a great number of species of their haunts, but it is wonderful how many birds cling to old localities, only moving before stone and lime.

A List of the Birds of East Renfrewshire, by Mr. John Paterson and the writer, appeared in the *Annals of Scottish Natural History* for October, 1895. These notes may be considered as

that list brought up to date. The number of species recorded for the district is 151. Those that have bred, marked with an asterisk, number 83, and there are other 4 whose nesting is doubtful.

In compiling this list I am indebted to Mr. Allan Gilmour, of Eaglesham, for information regarding occurrences on his property since 1895, indeed most of the information about the less common species in Eaglesham Parish is based on his notes, supplied to Mr. John Paterson in 1895, and to myself this year. For the first list we had help from Mr. W. Cox, head gamekeeper at Nether Pollok, and from Mr. Andrew Taylor, keeper at Pollok Castle, to both of whom I am again obliged for information received at various times during the intervening fifteen years. Then I have drawn on the experience locally of several members of this Society, and Mr. John Paterson has kindly assisted me with suggestions as well as with access to any data I required.

***MISTLE-THRUSH** (*Turdus viscivorus*).—A fairly common resident. In very severe winters, as in 1894-95, it seems to leave the district. The nest, often with eggs in the last days of March, is usually placed at varying heights in some tree, but I have seen it in a holly bush three feet from the ground; and I have known of two on the tops of tombstones, although there were plenty of trees to choose from. It sings from the turn of the year, if the weather be mild, until the last week of May.

***SONG-THRUSH** (*T. musicus*).—Abundant. In hard weather most of the birds leave this district. In open seasons some start their spring song a day or two before Christmas, and a few persist till about 21st July. I consider the Song-Thrush the most constant singer among all our song-birds—certainly from no other bird do we get such good value when quantity and quality are considered. The first nests in some seasons have eggs by the middle of March, while towards the end of July a few nests with young may still be found.

REDWING (*T. iliacus*).—Our most abundant winter visitor, begins to arrive about 7th October, and its numbers are added to all through that month. It may be heard passing overhead almost any dark night during the last three weeks of October. It is seldom seen in spring after the middle of April.

FIELDFARE (*T. pilaris*).—A common winter visitor, arriving about a fortnight later than the Redwing, a few remaining till May. Though it may be seen anywhere, it is more a bird of the uplands and the open country than its congener the Redwing, but altogether it is much less numerous than that species.

*BLACKBIRD (*T. merula*).—Common at all seasons and in the hardest frosts. Its fine song starts at the beginning of February and ceases about 21st July.

*(!) RING-OUZEL (*T. torquatus*).—Only three occurrences of single birds, on migration, two in spring and one in autumn, are known. Still, I believe, a thorough search of the Eaglesham uplands in the season would reveal a pair or two of nesting birds.

*WHEATEAR (*Saxicola oenanthe*).—Generally distributed on migration. A fair number nest in the upland districts, and a pair or two occasionally at lower elevations. It usually arrives about the fourth week of March, and the last birds leave in October.

*WHINCHAT (*Pratincola rubetra*).—Common, arriving in the last ten days of April and departing during September. It is a bird of the railway embankments, waste ground, and upland pastures and hayfields.

*STONECHAT (*P. rubicola*).—Mentioned in the *Notes on the Fauna and Flora of the West of Scotland* (1876) as having bred at Pollokshields. The only recent occurrences I know of are a pair near Newton-Mearns in the beginning of March, 1899, and a fine male at Balgray Dam, 24th March, 1907.

REDSTART (*Ruticilla phoenicurus*).—This species is frequently seen in passage in spring and autumn, but no instance of its nesting is known.

*REDBREAST (*Erithacus rubecula*).—Common, wherever there are woodlands or hedgerows, all the year round. It sings in every month of the year, but its thin, high-pitched song is perhaps most noticeable in autumn. I knew of a Robin brooding on an empty nest (in which there never had been eggs), for about a fortnight, before it gave up hope.

*WHITETHROAT (*Sylvia cinerea*).—A common species in summer. It arrives from 23rd April onwards, and disappears in September. I have noticed that by the end of June White-

throats affect many situations which a month earlier were not frequented by them, owing to cover being insufficient. It has seemed to me that the immigration of the Whitethroat is prolonged into June, and these outlying situations are occupied by the later arrivals.

LESSER WHITETHROAT (*S. curruca*).—Though this species has been the object of diligent search for many years only two occurrences are known; one bird which I saw at Cathcart on 8th August, 1909, and another seen by Mr. George Stout near Rouken Glen on 20th May, 1910 (*Annals of Scot. Nat. Hist.*, 1910, p. 182).

*BLACKCAP (*S. atricapilla*).—Rare. A pair or two visit Rouken Glen annually, and it has been heard at Upper Pollok, Giffnock, and by the Cart near Cathcart. Hugh M'Donald in his *Rambles round Glasgow* stated that it occurred on the Cart near Crookston, when he was a boy—that is over seventy years ago.

*GARDEN-WARBLER (*S. hortensis*).—Common in suitable situations. With us, like the Blackcap, it is first seen about the 7th of May. Rouken Glen and Darnley Glen are well known haunts, and there are some seven or eight other localities where it is known to occur more or less regularly.

*GOLDEN-CRESTED WREN (*Regulus cristatus*).—A common resident. It prefers woods where there are conifers, but out of the nesting season the Gold-crest may be found frequenting hedges and bushes far from woods.

*CHIFFCHAFF (*Phylloscopus rufus*).—Rare. We sometimes hear it in spring on its way to some other part of the country, but it has remained to breed at Giffnock and Rouken Glen. In 1905, I heard one calling as early as the 26th of March at Thornliebank.

*WILLOW-WREN (*P. trochilus*).—An abundant summer visitor, arriving from the 8th of April onwards.

*WOOD-WREN (*P. sibilatrix*).—Not common. A few pairs are found in the district in summer; in Darnley Glen, at Upper Pollok, Giffnock, and on the Cart between Busby and Cathcart.

*SEDGE-WARBLER (*Acrocephalus phragmitis*).—In most seasons this is a fairly common bird in summer, arriving from the end of April onwards, although in 1893 it was noted at Giffnock on

22nd April and at Patterton the following day. In 1908 it was remarkably scarce. By 1910 it had nearly recovered its normal numbers, as is shown by the fact that in one afternoon in early June I found five nests with eggs or young in Darnley Glen. One of these nests was eight feet above the ground.

*GRASSHOPPER-WARBLER (*Locustella naevia*).—A scarce and erratic summer visitor affecting certain spots for a season or two, perhaps not heard at all for several years, and then trilling forth from some new haunt. For a number of seasons it has remained in Darnley Glen throughout the summer.

*HEDGE-SPARROW (*Accentor modularis*).—Common. It sings in every month of the year, even in fairly hard frost.

*DIPPER (*Cinclus aquaticus*).—Common on all the clear streams of the district. Its song, commenced early in autumn, continues, without intermission, even in the hardest weather, till May. It is an early nester, the majority of clutches being completed before March is out. If undisturbed it nests in almost the same spot year after year.

*BRITISH LONG-TAILED TITMOUSE (*Acredula rosea*).—Not common. Seen most often in small parties in winter. It has nested in several localities in the district.

*GREAT TITMOUSE (*Parus major*).—Common. Next to the Blue Titmouse in point of numbers. Parties of a dozen or more are often seen in Rouken Glen in winter.

*COAL-TITMOUSE (*P. ater*).—Common in woods and even away from woods in winter. In summer, confined to plantations in which there are conifers.

*MARSH-TITMOUSE (*P. palustris*).—What we have hitherto known as the Marsh-Titmouse is an uncommon species with us. Though I believe it has nested in one or two instances, it is seen most frequently in winter, its distinctive note, *chay, chay, chay*, leading to its detection. In the winter of 1896-97 we had an invasion of this species. As many birds were seen in that season as have been observed altogether since then.

WILLOW-TITMOUSE (*P. atricapillus kleinschmidtii*, Hellmayr).—Early in December, 1910, Mr. Robert Wilson procured a Titmouse at Giffnock. This specimen he submitted to Mr. H. F. Witherby, M.B.O.U., editor of *British Birds*, who pronounced it to be a Willow-Titmouse. Some ornithologists are inclined to

believe that this species replaces the Marsh-Titmouse in Scotland. If dinginess, as exhibited in Mr. Wilson's specimen, is characteristic of the Willow-Titmouse, and comparative brightness, such as lighter cheeks and more buffish flanks, of the Marsh-Titmouse, then we have both, as I saw a conspicuously bright bird at Giffnock on 30th November, 1908. I do not recall another instance where brightness or colour in a Marsh-Tit appealed to me, so that, except for occasional immigrants, the opinion mentioned above as to the status of the two species in Scotland will probably turn out to be correct, but much information is required yet before the question can be decided.

*BLUE-TITMOUSE (*P. ceruleus*).—The most common member of the genus at all seasons.

*WREN (*Troglodytes parvulus*).—Common.

*TREE-CREEPER (*Certhia familiaris*).—A fair number are to be seen in winter. A few remain to nest.

*PIED WAGTAIL (*Motacilla lugubris*).—Common in summer, and a few to be seen during winter.

WHITE WAGTAIL (*M. alba*).—Often observed in spring, and less frequently on the return migration in autumn.

*GREY WAGTAIL (*M. melanope*).—Common on the Cart, and a few on some of our other rapid streams. In autumn and winter it may be seen on streams and ditches, where it is unknown in the nesting season.

*YELLOW WAGTAIL (*M. raii*).—A common summer visitor, arriving in the second half of April.

*TREE-PIPIT (*Anthus trivialis*).—Common by woods and rows of trees, appearing about the 21st of April.

*MEADOW-PIPIT (*A. pratensis*).—Common everywhere. By the end of November the majority have left us, only a few being seen from then till the end of March, when the bulk return.

*SPOTTED FLYCATCHER (*Musicapa grisola*).—This unobtrusive summer visitor is fairly well distributed.

*SWALLOW (*Hirundo rustica*).—Common. It arrives from the 9th of April onwards, and is seldom seen after the middle of October. The most curious circumstance in the economy of this species which has come under my observation, is its nesting in the tunnels in the sandstone quarries at Giffnock and William-

wood, referred to in the *Annals of Scottish Natural History*, 1895, p. 54. The tunnels present the appearance of great natural caves, and at Williamwood the nests are sometimes placed over the flooded workings, and are quite inaccessible. Up till last summer (1910) a few pairs were still nesting at Williamwood.

*HOUSE-MARTIN (*Chelidon urbica*).—This species seldom arrives before the fourth week of April, and it usually leaves this district earlier in autumn than the Swallow. At present it is scarce in that part of our area which lies close to Glasgow, being much better known as a bird of the upland farms. It has undoubtedly decreased much in numbers during the past thirty years, although during the last half-dozen years this decrease seems to have been checked, and there is even evidence of a slight recovery having taken place.

*SAND-MARTIN (*Cotile riparia*).—This species, which arrives from the 5th of April onwards, is often seen on the wing, though we have very few suitable nesting sites for it. It usually nests in colonies, but I have seen a solitary nest in a hard bank by the side of the Long Loch. The Sand-Martin is the first of our three hirundines to leave in autumn, being seldom seen after the middle of September.

*GREENFINCH (*Ligurinus chloris*).—Abundant. Nests with eggs may be found from the second week of April till the second week of September, and the bird is in song from the middle of March till the beginning of September.

*GOLDFINCH (*Carduelis elegans*).—Scarce. Within the last few years a slight increase in numbers has taken place, and we may now consider the bird established, or re-established, as a nesting species, in small numbers in one locality at least.

*SISKIN (*C. spinus*).—An uncommon winter visitor, sometimes taken by bird-catchers. The late Mr. Dan Waterhouse saw several feeding on seeds of knapweed at Pilmuir on 1st January, 1906, as he kindly informed me at the time. A nest with young was said to have been taken by an under keeper at Nether Pollok about twenty years ago.

*HOUSE-SPARROW (*Passer domesticus*).—Abundant.

*CHAFFINCH (*Pringilla caelebs*).—Common. It is in song from the end of February till the first week of July.

BRAMBLING (*F. montifringilla*).—Usually an uncommon winter visitor, but in the winter of 1906-7 it appeared in the district in considerable numbers. On 20th January, 1907, at Cowglen, I saw a flock of about one hundred and twenty birds, consisting mostly of Bramblings, with a very few Chaffinches. This was the largest local flock that I knew of, although the bird was often seen in smaller parties. In the same year Mr. John Paterson saw about a dozen birds in Rouken Glen as late as 8th April.

*LINNET (*Linota cannabina*).—The Rose, or Grey Linnet, is almost unknown, unless as an autumn and winter visitor. A few have sometimes been seen in the latter season on waste ground near the city. In autumn and winter it is well known in considerable flocks in the vicinity of Waulkmill Glen Dam. It has been reported to nest on one occasion a few hundred yards over our boundary, in Neilston Parish.

MEALY REDPOLL (*L. linaria*).—This winter visitor was first noticed in the district at Giffnock during the present winter, 1910-11. It was often seen, usually in small numbers, along with Lesser Redpolls, but at Giffnock on 2nd January I saw a mixed flock of about forty birds, and more than half of these were Mealy Redpolls.

*LESSER REDPOLL (*L. rufescens*).—Well known in winter in small flocks all over the district. A few nests used to be found annually near Giffnock, but, though that locality has been abandoned in the nesting season for many years, I believe a few pairs still breed in other parts of our area, as the bird is to be seen all summer.

*TWITE (*L. flavirostris*).—Occurs in considerable flocks in winter. In summer a few nest in the moorland parts of Mearns and Eaglesham Parishes.

*(?) BULLFINCH (*Pyrrhula europæa*).—Comparatively rare in the district, chiefly appearing in winter.

CROSSBILL (*Loxia curvirostra*).—Mr. John Paterson has heard of the occurrence about twenty years ago of a wandering party of Crossbills at Hangingshaw. His informant, Mr. John Innes, belonged to a district in the North of Scotland where Crossbills were well known.

*CORN-BUNTING (*Emberiza miliaria*).—A scarce species, but it

has been seen, and probably has nested in all our parishes but Eaglesham.

*YELLOW BUNTING (*E. citrinella*).—Common.

*REED-BUNTING (*E. schæniclus*).—A well-known bird in the district, but much less numerous than the Yellow Bunting.

SNOW-BUNTING (*Plectrophenax nivalis*).—An uncertain winter visitor, sometimes occurring in flocks and sometimes singly.

*STARLING (*Sturnus vulgaris*).—Common. Mr. John Paterson gives me the following extract from his notes relating to 2nd March, 1899:—"On entering Queen's Park to-night on the way home, say, at 5.35, I noticed a flock of Starlings, 200 birds or so, pursuing a westerly flight. On crossing the Recreation Ground to Mount Florida several other companies passed westwards, one of which probably numbered over a thousand birds. Occasionally single birds passed over, but the direction was always pretty much the same. Coming through by the station, I saw a steady stream passing, and on reaching home I continued to watch the movement till 6.5 p.m., by which time it appeared to be over. All the time I watched there was never an interval of more than half-a-minute without birds being in sight, and their numbers must have reached somewhere between 5/10,000. They were flying at a low elevation, having to rise in their westerly flight to clear the tenement houses in Cathcart Road. A very strong S.-W. wind was blowing. Messrs. Robert and Hugh Wilson saw a similar movement at the same time of day in this district at Hangingshaw on 19th February, the birds passing in the same direction."

JAY (*Garrulus glandarius*).—The only records refer to two stray examples. One was caught at Nether Pollok about thirty-five years ago in a trap set for a prowling domestic cat. Another was shot forty years ago in the Stonebyres Wood, on Mr. Gilmour's property.

*MAGPIE (*Pica rustica*).—A few nest all over the district, even on small trees in the uplands.

*JACKDAW (*Corvus monedula*).—Common, but greatly outnumbered by the Rook.

RAVEN (*C. corax*).—Mr. Gilmour has in his possession one shot in the Stonebyres Wood about thirty years ago.

*CARRION-CROW (*C. corone*).—A scarce bird in the district. A pair or two nest annually in the higher districts.

HOODED CROW (*C. cornix*).—Even scarcer than the Carrion Crow, and not known to nest in the district.

*ROOK (*C. frugilegus*).—Abundant.

*SKY-LARK (*Alauda arvensis*).—Common in summer, particularly on the grassy uplands. In winter large flocks are often seen. It usually sings from February to July, resumes for a little at the end of September or in October, and even gives vent to snatches of song in the winter months.

*SWIFT (*Cypselus apus*).—Fairly common, arriving in the last days of April or first two or three days of May. Seldom seen after August.

NIGHTJAR (*Caprimulgus europæus*).—Mentioned by Gray as occurring in Queen's Park, and has been heard at Nether Pollok. The only recent occurrences are at Nether Pollok, 21st May, 1899, and Upper Pollok, 3rd October, 1905, a single bird being caught in each instance.

[WRYNECK (*Ijnx torquilla*).—In a note in the *Annals of Scottish Natural History*, 1905, page 244, Mr. T. Thornton Mackeith says, "In June, 1904, a nest was found in a plantation near Darnley Rifle Range. The nest was situated in a hole in a decayed fir tree. The seven white eggs were laid on the crumbled wood, there being no nest material. The finders did not know what the eggs were, and brought them to me for identification. After careful examination, I pronounced them to be the eggs of the Wryneck (*Ijnx torquilla*)."
The identification of the eggs was confirmed by Mr. Harvie-Brown, but the editors of the above-mentioned magazine, commenting on the note, say, "It has been said to breed in Scotland before, but on evidence which cannot be regarded as satisfactory, and this to some extent applies to the present record."]

*KINGFISHER (*Alcedo ispida*).—Well known on all our streams, and even frequenting in winter small ponds and ditches. A few pairs nest.

*CUCKOO (*Cuculus canorus*).—Common, arriving from the middle of April. With us it is perhaps best known as a bird of the uplands.

*BARN-OWL (*Strix flammea*).—This is a species which I have seldom seen or heard in the district. I have only heard of one nest in recent years, viz., at Giffnock quarries in 1909.

*LONG-EARED OWL (*Asio otus*).—Comparatively common, and the best known owl in the district.

SHORT-EARED OWL (*A. accipitrinus*).—Well known in autumn to sportsmen on our moors.

*TAWNY OWL (*Syrnium aluco*).—Only a little less common than the Long-eared Owl.

SNOWY OWL (*Nyctea scandiaca*).—One was obtained at Pollokshields in 1863 (Gray, *Birds of the West of Scotland*, p. 63).

HEN-HARRIER (*Circus cyaneus*).—Mentioned in the *New Statistical Account* of Eaglesham.

*SPARROW-HAWK (*Accipiter nisus*).—While this is not a common species, a few pairs nest every year.

PEREGRINE FALCON (*Falco peregrinus*).—The writer of the *New Statistical Account* of Eaglesham says he has handled examples of this species, and the Hobby, which were shot on Mearns Moor. I quite accept his identification of the Peregrine, but with the Hobby it is otherwise as the latter has never been more than a casual visitor to Scotland, having been known to nest only in a single instance. On 24th October, 1909, I saw a Peregrine Falcon in the brown plumage of immaturity, at Muir-end, Cathcart.

[HOBBY (*F. subbuteo*).—See previous species.]

* (?) MERLIN (*F. aesalon*).—Is occasionally seen in autumn, has been shot in Mearns and Eastwood parishes, and may even nest on the heathery parts of Eaglesham Moors.

*KESTREL (*F. tinnunculus*).—A few are to be seen from autumn to spring, but it is scarce in the nesting season.

CORMORANT (*Phalacrocorax carbo*).—Mr. Gilmour saw one on 22nd December, 1894. I saw two at Cowglen about twenty-seven years ago, and in recent years one at Waulkmill Glen Dam, and one at Little Loch. Mr. Robert Wilson tells me of one, seen by himself and others, at Balgray Dam last autumn (1910).

SHAG (*P. graculus*).—The late Morris Young, of Paisley Museum, informed Mr. John Paterson of the occurrence of this species at Glanderston Dam.

GANNET (*Sula bassana*).—I saw a party of six passing over Thornliebank on 29th June, 1892, a most unusual sight inland. An example was captured in a field at Nether Place on 25th

September, 1899. I was shown the head, wings, and feet of this specimen by the late Dan. Waterhouse, from whom I had the particulars.

* (?) COMMON HERON (*Ardea cinerea*).—Although there is no satisfactory evidence regarding the breeding of the Heron in the district, the bird is well-known by the streams and sheets of water. Parties up to fourteen have been frequently seen.

BEAN GOOSE (*Anser segetum*).—Grey geese have frequently been seen in the district, but in only one instance has a grey goose been specifically identified, and that was at Eaglesham, where a male Bean Goose was shot on 20th February, 1907, as Mr. Gilmour has informed me.

BERNACLE-GOOSE (*Bernicla leucopsis*).—Mr. Gilmour, on 5th October, 1882, saw twenty-five Bernacle Geese alighting at Binend Loch. Some shot at that time are in his possession. On 8th October, 1887, he saw a flock of thirty heading south-east. Mr. Peter Goodfellow saw two on an island in Balgray Dam on 16th October, 1910.

BRENT-GOOSE (*B. brenta*).—On 1st January of this year (1911) I watched an example of the white-bellied form of the Brent Goose for some time by the edge of Balgray Dam. It was feeding apparently on chickweed growing a few yards back from the water. The bird was alert, strong on the wing, and did not seem to be injured in any way.

BEWICK'S SWAN (*Cygnus bewicki*).—On 1st January, 1907, I saw and heard a Bewick's Swan, at Giffnock, flying south-west.

MUTE SWAN (*C. olor*).—Mute Swans have frequently been seen in the district, but whether any of these were immigrants from Northern Europe it is impossible to say.

COMMON SHELD-DUCK (*Tadorna cornuta*).—This species has been shot once at Nether Pollok, and has been seen several times at Balgray Dam, singly or in small flocks. Mr. Gilmour saw a flock of ten at Eaglesham.

*MALLARD (*Anas boscas*).—Occurs in large flocks in winter, but comparatively few remain to breed. The same hollow is sometimes used for a nesting place for many years in succession.

GADWALL (*A. strepera*).—Mr. Gilmour informs me of one shot at Eaglesham on 9th December, 1904, the only occurrence known in the area.

SHOVELER (*Spatula clypeata*).—Single birds have been shot at Nether Pollok and Balgray Dam. Others, sometimes pairs, have been seen at Balgray Dam, Little Loch, and Harelaw Dam, but it is a scarce duck, and is not known to breed with us.

PINTAIL (*Dafila acuta*).—Rare. In the winter of 1894-95 one was shot on a pond and one on the Cart at Nether Pollok, and another at Balgray Dam. Last autumn (1910) an example was obtained on Eaglesham Estate. Pairs have been observed in May, twice at the Little Loch and once at Dunwan Dam.

*TEAL (*Nettion crecca*).—Well known from autumn to spring in small flocks up to forty. A few nest.

WIGEON (*Marcca penelope*).—Common from autumn to spring. A drake was seen at the Little Loch on 9th June, 1895, and a pair, drake and duck, at Waulkmill Glen Dam on 12th June, 1910.

POCHARD (*Fuligula ferina*).—Occurs in large flocks in winter. In some years a few have been seen on Balgray Dam most of the summer, but it is not known to nest in East Renfrewshire.

*TUFTED DUCK (*F. cristata*).—Common. It is often seen in large flocks on Balgray Dam. It is the commonest nesting duck in the district, but since 1894 its numbers in summer have remained pretty much the same.

SCAUP-DUCK (*F. marila*).—A scarce and irregular visitor. A few remained on Balgray Dam all through the summer of 1896.

GOLDENEYE (*Clangula glaucion*).—A common winter visitor, usually arriving in October, seldom earlier, and remaining till May. It is seen singly or in small parties, fourteen being about the greatest number seen together.

LONG-TAILED DUCK (*Harelda glacialis*).—Mr. Gilmour informs me of the only occurrence of this species in the district, a young bird shot at Eaglesham on 24th October, 1906.

GOOSANDER (*Mergus merganser*).—Small numbers are frequently seen on the upland lochs and reservoirs in winter, and specimens have been shot on Eaglesham and Fingalton estates.

[RED-BREASTED MERGANSER (*M. serrator*).—This species has been stated to occur as a winter visitor, but there is no evidence to support this report. There is probably confusion with the Goosander. In the meantime it has been thought right to exclude the Red-breasted Merganser from this list.]

*RING-DOVE (*Columba palumbus*).—Abundant. Nests may be found from early April till October.

*STOCK-DOVE (*C. aenas*).—Towards the end of a spell of hard frost, nearly forty years ago, Mr. Cox trapped a number of small doves at Nether Pollok, no doubt referable to this species, but it was not till 1908 that the Stock-Dove was positively identified as an East Renfrewshire bird. In that year it nested on the Cart, above Cathcart, on Mearns Moor and at Glanderston Dam (*The Glasgow Naturalist*, Vol. I., pp. 108-109). It is still a scarce species with us, being seldom seen, and not many pairs nesting in the whole of our district.

*BLACK GROUSE (*Tetrao tetrix*).—A breeding species in Mearns and Eaglesham. About a hundred cocks have been shot on one estate in a season, though the average bag is about thirty per annum.

*RED GROUSE (*Lagopus scoticus*).—Common in suitable localities in Eaglesham and Mearns.

*PHEASANT (*Phasianus colchicus*).—Common.

*PARTRIDGE (*Perdix cinerea*).—At present (1911) the Partridge is comparatively scarce in this district. It was more common twenty-five years ago.

QUAIL (*Coturnix communis*).—Has occurred once at Nether Pollok and once at Eaglesham, a single bird in each instance.

*CORN-CRAKE (*Crex pratensis*).—Common, arriving regularly in the last week of April. In 1905 the Corn-crake was scarce in East Renfrewshire, there being less than half the usual number present, and even by 1910 it was hardly back to the number obtaining before 1905. August 6th is the latest date on which it has been heard calling—at Crossmyloof, and Mr. John Paterson saw one alive which had been caught there by a policeman on 22nd November, 1904.

*WATER-RAIL (*Rallus aquaticus*).—Has been frequently seen and obtained throughout the district, mostly in winter. In Rouken Glen it has been observed often, and on one occasion an individual was seen feeding unconcernedly by the edge of the stream, twelve yards from a footpath, and in full view of the visitors constantly passing. It probably nests in the district every year, but only one authentic instance of its doing so is known, the newly-hatched young being seen by Mr. Keith Buchanan.

*MOOR-HEN (*Gallinula chloropus*).—Common. The Water-hen is one of the best-known birds in Rouken Glen at all seasons.

*COOT (*Fulica atra*).—Common on most of the larger sheets of water.

RINGED PLOVER (*Ægialitis hiaticola*).—Is often seen by the margins of the reservoirs and lochs in spring and autumn, singly or in small parties up to eight. On the morning of 27th February, 1899, which was foggy, with eight degrees of frost, I heard a Ringed Plover flying about at Thornliebank railway station. I heard its note eight or nine times. The bird evidently had lost its bearings in the fog.

*GOLDEN PLOVER (*Charadrius pluvialis*).—Common in flocks on the arable land in autumn and winter. Comparatively few remain to nest in the uplands. In open seasons some of the eggs are laid in the first week of April.

GREY PLOVER (*Squatarola helvetica*).—A very rare straggler in autumn. I saw one bird at Balgray Dam several times in September and October, 1895, and another at the same place in September, 1901. These are the only occurrences known in the district.

*LAPWING (*Vanellus vulgaris*).—Common. In autumn and winter immense flocks are sometimes seen. If the frost is very severe they retire to the coast, to return as soon as a thaw sets in.

OYSTER-CATCHER (*Hæmatopus ostralegus*).—This species is often heard from spring to autumn passing overhead at night. Single birds and pairs have several times been seen at Balgray and Waulkmill Glen Dams, and a straggler was seen in the Recreation Ground, Queen's Park, Glasgow.

WOODCOCK (*Scolopax rusticula*).—A few are shot in winter. Not known to breed in the district.

GREAT SNIPE (*Gallinago major*).—An example of this species was shot on Eaglesham Estate in 1869, another in 1895: one was shot on Upper Pollok Estate in 1901, and Mr. John Paterson believes that he saw one at Williamwood (Catheart) in November, 1909.

*COMMON SNIPE (*G. caelestis*).—Common. In autumn it is sometimes so abundant that in walking round the various reservoirs which comprise the Gorbals Water-Works hundreds of birds may be flushed.

JACK SNIBE (*G. gallinula*).—Always a few in winter. With us it appears to be a somewhat solitary species. It is sometimes flushed from much drier situations than the Common Snipe affects.

*DUNLIN (*Tringa alpina*).—Common on the Mearns and Eaglesham Moors in summer, but its numbers vary, being more abundant in some seasons than in others. It begins to return to its breeding haunts about the middle of April, and nests with eggs may be found from the 30th of that month. By the end of July old and young have left the nesting grounds, but Dunlins may be seen regularly by the margins of the lochs and reservoirs up to the end of October, the latest date being 12th November, 1905—a few still at Balgray Dam. The birds seen in the later months are on passage. Many are also seen on passage in spring and early summer. On 24th May, 1894, Mr. John Paterson and I had a remarkable experience at Dunwan Dam. Dunlins were flying in scores over the water and the moor in the vicinity. Only a tithe of the birds seen could have been nesting in the neighbourhood.

LITTLE STINT (*T. minuta*).—The only time this species has been noticed was in 1905, at Balgray Dam, where I saw two Little Stints on 2nd September and four next day.

CURLEW-SANDPIPER (*T. subarquata*).—Has been observed in small numbers in various years from 1896 to 1910 at Balgray and Waulkmill Glen Dams. It is seen in September and October.

RUFF (*Machetes pugnax*).—A regular autumn visitor to Balgray and Waulkmill Glen Dams, where eight have been seen in one day. Mr. Gilmour shot one at Eaglesham. It is a most silent bird with us. I have never heard one utter a note.

*COMMON-SANDPIPER (*Totanus hypoleucus*).—Common, arriving about the middle of April and leaving by the end of September.

GREEN SANDPIPER (*T. ochropus*).—One was shot and another seen on the Cart at Nether Pollok, 10th November, 1868 (*Birds of the West of Scotland*, p. 293). Single birds were observed at Hangingshaw, December, 1904, and at Rouken Glen, April, 1905.

*REDSHANK (*T. calidris*).—Common in summer. Although not occurring here in such large flocks as at the coast, I have seen about fifty birds at one time, in March, on the mud at Waulkmill Glen Dam.

SPOTTED REDSHANK (*T. fuscus*).—One bird was seen at Balgray Dam in October, 1898, and a pair at the same place in September, 1899. A single bird was observed many times at Waulkmill Glen Dam from August to October, 1909. In 1910, also at Waulkmill, I saw one bird in dusky plumage on 26th June, while in the autumn, from 14th August till 30th October, Spotted Redshanks were often seen, mostly at Waulkmill, but occasionally at Balgray, the numbers varying from one to three birds. There is an impression that this species is easily confused with the Common Redshank, but no field ornithologist should have difficulty in distinguishing the two species. In summer the dusky plumage of the rarer bird separates it from all its congeners of a similar size. In autumn the longer bill and legs, and the absence of white on the wings distinguish it from the Common Redshank. It has also a very distinct note, an assertive *ter-wee*.

GREENSHANK (*T. canescens*).—A regular visitor in autumn, in small numbers, to the larger sheets of water. It has occasionally been seen in the winter months.

BAR-TAILED GODWIT (*Limosa lapponica*).—A Bar-tailed Godwit in winter plumage frequented Waulkmill Glen Dam at the end of September and beginning of October, 1909, and I believe I have heard this species pass overhead after dark.

BLACK-TAILED GODWIT (*L. belgica*).—One bird was seen at Balgray Dam in September, 1899, and another at Waulkmill Glen Dam in August and September, 1909.

***CURLEW** (*Numenius arquata*).—Common on the uplands in spring and summer, and in other parts of our district it is often seen during the day, and heard after dark, as it passes from one part of the country to another. Though most of these passing birds are observed from spring to autumn, still they are not entirely confined to that season.

WHIMBREL (*N. phaeopus*).—Has been seen and heard on a few occasions in May on Mearns Moor, and once in August (1906) at Balgray Dam.

***COMMON TERN** (*Sterna fluvialis*).—The Common Tern has often been seen, especially in autumn, and since 1902 a pair has nested on several occasions at the Brother Loch.

[SABINE'S GULL (*Xema sabini*).—On 20th September, 1896, at Balgray Dam, I saw pass leisurely over a "tern-like bird, with

dark upper parts, white underneath, white chin, greyish or brownish throat, and rather wavering flight." It seemed smaller than a Common Tern and the tail was but slightly forked. From its tern-like appearance and manner I tried at the time, but unsuccessfully, to make it agree with the young of some of the terns. I have now little doubt that it was a Sabine's Gull, a bird of the year.]

*BLACK-HEADED GULL (*Larus ridibundus*).—Abundant. The great colony at Harelaw Dam is just on the borders of our district. On most of our larger sheets of water the birds have from time to time attempted to found other colonies, but the egg-lifter, not the egg-collector, sees to it that these attempts are unsuccessful.

COMMON GULL (*L. canus*).—Rather scarce with us, although occasionally a considerable flock has been seen. It occurs from autumn to spring.

HERRING-GULL (*L. argentatus*).—Common in flocks in winter, and a few may be seen throughout the summer.

LESSER BLACK-BACKED GULL (*L. fuscus*).—Common (though in much smaller numbers than the Herring-Gull) from the end of March till the end of September, and an odd bird may be seen in November.

GREAT BLACK-BACKED GULL (*L. marinus*).—On 31st May, 1899, Mr. Hugh Boyd Watt saw a pair of these birds at Balgray Dam, and on 6th November, 1910, I saw one in a field near Mansewood.

KITTIWAKE GULL (*Rissa tridactyla*).—One was found dead at the Brother Loch, 11th November, 1894. Mr. John Paterson saw one at Hangingshaw, 17th November, 1895, and on 21st April, 1909, after dusk, I heard the notes of what was evidently a small flock of this species passing overhead near Muirend.

RAZORBILL (*Alca torda*).—On 24th September, 1905, I saw an immature Razorbill on Waulkmill Glen Dam. The day was fine with bright sunshine, and there had been no stormy weather for some time.

GUILLEMOT (*Uria troile*).—One was seen by Mr. John Paterson on Ryat Linn Dam on 2nd October, 1910. Like the Razorbill mentioned above, this example was not storm-driven, as September and October, 1910, were unusually fine months.

LITTLE AUK (*Mergulus alle*).—One was captured at Balgray Dam on 31st January, 1895, during the notable irruption of this species.

PUFFIN (*Fratercula arctica*).—Stragglers have been got, one at Darnley and another near Mearns Castle, and I saw an immature bird on Balgray Dam on 14th September, 1895.

BLACK-THROATED DIVER (*Colymbus arcticus*).—On 2nd January, 1896, I saw one on Balgray Dam, and Mr. Andrew Taylor shot another there on 20th December, 1897.

RED-THROATED DIVER (*C. septentrionalis*).—One was shot on Waulkmill Glen Dam about nineteen years ago. I saw one on Balgray Dam on 29th March, 1910, and other divers, probably referable to this species, have been seen from time to time.

*GREAT-CRESTED GREBE (*Podiceps cristatus*).—A few pairs of this fine species nest in our area. Within the last few years considerable congregations have been noticed in autumn on Balgray Dam, the greatest number of birds seen together being twenty-three, on 12th September, 1909.

[RED-NECKED GREBE (*P. griseigena*) and SCLAVONIAN GREBE (*P. auritus*).—These may be what the writer of the *New Statistical Account* of Eaglesham Parish meant when he mentioned *Podiceps ruficollis* and the Eared Grebe, but there has been too much confusion among the smaller grebes to admit these two to the list without more recent evidence.]

*LITTLE GREBE (*P. fluvialis*).—Common all over the district. On Balgray in autumn sometimes about thirty may be seen in company.

FORK-TAILED PETREL (*Oceanodroma leucorhoa*).—One was found dead near Mearns on the day of the Tay Bridge storm in December, 1879. This example was in the possession of the late Dan Waterhouse, Newton-Mearns.

A preliminary Investigation of *Cladothrix dichotoma* (Cohn).

By DAVID ELLIS, D.Sc., Ph.D., F.R.S.E.

[Read 29th November, 1910.]

INTRODUCTION.—This plant was described by Zopf in 1882 as one of the commonest and most widely distributed water-organisms. He stated that wherever organic matter was present in a state of slow decomposition, there this organism was almost

sure to be found. It is not, however, of common occurrence in Scotland, and in places where, if present, it is certain to be found, viz., in attachment to green vegetable matter, undergoing decomposition under water, one generally finds, not *Cladothrix dichotoma*, but some member or other of the Phycomycetes. This plant has been the subject of much research on the continent, partly because of the frequency of its occurrence, but chiefly on account of the fact that occasionally, when conditions are very favourable, multiplication at an enormous rate takes place. When this happens in the pipes which supply a town with water, the flow of water is seriously hindered by the accumulation of the remains of this organism. In 1888 *Cladothrix dichotoma* and *Crenothrix polyspora* multiplied with extraordinary rapidity in the Water-works of Rotterdam. The free supply of water to the town was seriously hindered, and resulted, after the removal of the pest, in a renewal of research, so that we are to-day in possession of a large body of facts relating to its life-history. The writer has found this plant in Possil Marsh, near Glasgow, in a very fine state of cultivation, and has thus had a good opportunity of making an investigation into its life-history. Observations are further necessary, because the plant has not hitherto been studied in this country.

It is included among the Iron-bacteria on account of its frequent presence in ferruginous waters, but, inasmuch as it is more frequently present in non-ferruginous waters, and even when present in the former waters much deposition of ferric hydroxide is not found on its membranes, it cannot be strictly described as a member of the Iron-bacteria. A certain amount of organic matter in solution in the surrounding water is absolutely essential to its growth: if ferruginous water does not contain organic matter, there is no growth. The organic matter must be in a very dilute condition, otherwise, in Possil Marsh, organisms like *Bacillus fluorescens-liquifaciens* obtain the upper hand and soon swamp the *Cladothrix* threads. In artificial cultures a drop of Liebig's flesh-extract solution added to 500 c.c. of tap-water will maintain a colony composed of thousands of threads for several days.

GENERAL STRUCTURE.—*Cladothrix dichotoma* has a thread-like structure. These threads are in some cases comparatively

long (about 2 mm.), and are attached to small objects, particularly to blades of grass growing under or on the surface of water, which are in the first stage of decomposition. When growing in a stream with slowly moving water, the threads usually become mechanically attached, to such an extent, in fact, that large streamers, composed entirely of attached members of *Cladotrix dichotoma*, are often attached to the grass blades. The attachment, however, is very slight, for when microscopically examined, except under certain conditions to be described later, there is no trace of this mechanical connection. The width of the threads is about $3.4\ \mu$ ($\mu = \frac{1}{100000}$ mm.). Very exceptionally the width is below $3\ \mu$. The microscopic appearance of the thread does not often show any marked characteristics until it is

stained. The best stain for purposes of identification is iodine. When thus treated, the thread is seen to be composed of a number of serially arranged cells surrounded by a tubular sheath. The general appearance is represented in Fig. 1. There is no distinction between base and apex, the thread being uniformly thick at all points. When stained with iodine the cells are seen to possess each a distinct membrane of its own, in addition to the sheath, which covers them on the outside. If the thread is immature the sheath completely encloses the cells, but after a certain stage of growth has been reached, the free end is seen to be open (Fig. 1a), and a very little examination of a number of threads is enough to show that these cells are being gradually extruded into the surrounding water. The writer has, on

one occasion, seen one of these structures being actually launched out of the apex of the tube. When a thread is in a young condition the sheath is merely a mucilaginous mass enveloping the cells; its growth keeps pace with their division, and stained specimens show that the mucilaginous envelope is formed transversely between the cells as well as along



FIG. 1.



FIG. 1a.

their sides. Later, however, the sheath seems to harden and cannot keep pace with the division and multiplication of the cells, which accordingly break through the apex, and also break down the transverse bars of the sheath between the cells. The sheath having now a firm consistency, and being also broken at the top, has a tubular appearance, and the gonidia, still growing and dividing, are passed successively out at the apex. When, however, the conditions of growth are such as preclude the hardening of the sheath, we do not find the above-mentioned characteristics. Instead, portions of varying sizes are detached, which move away and ultimately come to rest, forming new colonies and extending the area of infection.

It sometimes happens that single cells are able to detach themselves from the thread, but are unable to move away, owing no doubt to the grip of the unhardened sheath. Each one of these grows, therefore, by the side of the parent-thread, and gives the appearance of being a branch of it. When this takes place

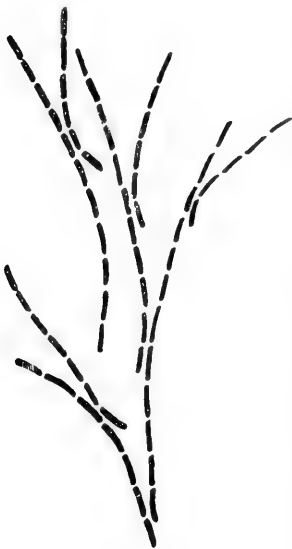


FIG. 2.

repeatedly, not only on the parent-thread, but also on the daughter-threads attached to it, it will be readily seen that the ultimate result will be the production of a tree-like growth. This is shown in Fig. 2, and is the one that is reproduced in all text-books dealing with the subject. In the Possil Marsh streams, however, this formation was very seldom observed; it evidently only occurs when certain conditions hold. These are probably a diminution in the rate of flow of the water and certain conditions regulating the consistency of the slimy sheath, and the rate of growth of the liberated cells. In artificial cultures the writer was not once able to obtain this

trec-like growth; neither do other writers mention that they were successful in this direction. In spite of this, however, when once seen and examined, *Cladophrix dichotoma* is an organism

that is very easy to identify, because there is no other organism of approximately the same size that is similar to it in any way.

THE STRUCTURE OF THE CELLS.—Iodine has very little staining effect on the sheath, but on the enclosed cells a very marked result is obtained. The cell-membrane takes on a very deep brown colour, so that its outlines become plainly visible. The contents of the cell are coloured in the same way, but not to the same extent. The best results are obtained by staining material as soon as possible after collection. If the material is in the best of condition, globules of an oily nature will be found mixed with the cytoplasm, and, in addition, particles of reserve food that stain like glycogen. Sometimes the oily globules are few and large, at other times more numerous and small. The same applies to glycogen globules. The oily globules are, however, mixed with some other substance which stains slightly with iodine, so that the drops are not composed entirely of an oily substance, but are probably a mixture of this with some other reserve material which is not oily in composition. When left in an enclosed tube these reserve materials rapidly disappear. It is probable that the membrane as well as the cytoplasm is the seat of the storage of food, for the starvation of the cells results in a comparatively rapid withdrawal of stainable material from the membrane. That the membrane, however, is present as a definite cell structure, not being merely the outermost layer of the cytoplasm, is made evident by plasmolysing the cells, when the cytoplasm recedes from the membrane owing to the withdrawal of its water. The membrane, being unaffected, is thus separated, and stands forth as a sharply-outlined shell.

MULTIPLICATION OF THE CELLS.—As a young thread is in process of elongation the sheath may be considered merely as an envelope of more or less mucilaginous matter, which offers no resistance to the growth and division of the cells. This process takes place in exactly the same manner as in the lower bacteria. A division-wall is thrown across the middle of the cell, being rapidly followed by a constriction at the plane of division. The constriction extends deeper, and, in the meantime, a slight elongation and a slight increase in thickness of the division-wall is concurrently taking place. This finally results in a complete separation of the two daughter-cells. The young cells then grow

to the normal adult length. The process of multiplication of the cells results in a considerable pressure from behind, so that if the apex of the sheath be open the topmost cells will be thrust out into the surrounding water. It is common, however, to find the top part of a sheath at this stage quite empty, whilst, at the attached end, the cells may be in all stages of division. Apart from the fact, to be presently described, that the cells develop cilia, it is obvious that this division and growth of the basal cells will be sufficient to cause the extrusion of the apical ones. When the outside is reached the cells may be either in a motile or in an immotile condition. The motile cells will be described in the next paragraph. With regard to the immotile cells, elongation and division takes place, and sooner or later attachment is effected, a sheath is developed, and the cycle once more completed. It is possible that the immotile cells may subsequently develop organs of motion, but at present we have no indication of such a change, neither does any other writer describe it as probable. We have not, however, sufficient investigation on this point to be certain that it never does take place.

THE ORGANS OF MOVEMENT.—As in the case of the genus *Bacillus*, movement is effected by the aid of cilia. These cilia have been described both by Fischer and by Höflich as being sub-polar, and their figures bear out their description. It is worthy of note that the Possil Marsh representative of this species has cilia which are not sub-polar in position, but are inserted at the extreme ends. The cilia are also relatively fewer than in those described by these investigators, but no diagnostic conclusions can be drawn from this fact. The writer's own experience has shown that the number of cilia on the majority of organisms examined by him is a variable quantity, depending on the favourable or unfavourable conditions of the environment. The insertion of the cilia, however, at the poles is a very significant fact, and would be sufficient to show that the Possil Marsh representative is at least a new species. There is, however, a very strong objection to this, viz., that, as we have only the observations of two investigators as to the sub-polarity of the insertion of the cilia, we cannot be certain that the species examined by them does not also exhibit polar as well as sub-polar ciliation. The writer is engaged in investigating the poly-

morphism of *Cladothrix dichotoma*, and finds that under new conditions, or even in apparently the same conditions, there is a remarkable plasticity in its nature. Hence, for the present it is unwise to regard the Possil Marsh representative other than as a variety of *Cladothrix dichotoma*. The ciliation is shown in Fig. 3.

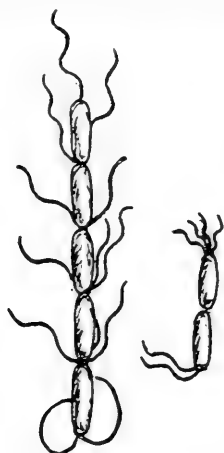


FIG. 3.

ARTIFICIAL CULTURES.—The first investigator to obtain pure cultures was Büsgen (1894). His nutrient medium consisted of water to which a very little flesh-extract, not enough to colour the water, had been added. He secured a solid medium by adding just as much gelatine as was sufficient to make the medium hold together. When this medium was inoculated with *Cladothrix* threads, after a day or two, round white specks made their appearance, which later formed aureoles round themselves, consisting of long threads of the typical *Cladothrix* form. On the stab-cultures there was no growth on the surface of the gelatine, but along the stab-canal a growth consisting of typical threads was developed, though these were evidently not in a very healthy condition, for he reports that there were no visible contents in the cells, a condition of affairs which is seen only in cultures growing under unfavourable conditions. A very exhaustive study of the conditions which regulate the artificial culture of this plant was made by Hoellich in 1901. Unlike Büsgen's experience, the artificial culture was attended at first

with great difficulty. The best solution for its growth was found to be a mixture of—

0·5 grams flesh-extract.

1 litre water.

Even in ordinary tap-water a good but somewhat slow growth was obtained. It was necessary to protect the vessel in which growth was taking place by covering the top with filter-paper. This was necessary to protect the flesh-extract from the ravages of any chance bacteria that might fall into the liquid. The writer's experience with regard to this point was the same as that of Hoefflich. Whilst a very little flesh-extract is necessary to secure a good growth, if enough were placed to colour the water, there was an immediate preponderance in the growth of other organisms that had been picked up along with *Cladothrix*. The addition of such food materials as peptone or salt not only accelerated the growth of other organisms, but stopped that of *Cladothrix* altogether. When conditions were favourable, throughout the liquid small clumps of a whitish-grey colour could be seen. The liquid itself was quite clear and colourless, there being an absence of all traces of turbidity. Microscopically examined, each little clump was found to consist of a light-brown semi-transparent central portion, from which masses of threads radiated in all directions. The cells were full of visible reserve material in the form of oil-globules and a substance resembling glycogen, thus being evidently in good condition. This was sustained till about the sixth day, after which there was a gradual falling off, until after the tenth day, when degeneration had begun to set in. In all essentials, therefore, the growth and multiplication are identical with those observed by Büsgen and Hoefflich. The latter records further that the optimum temperature was about 25° C.

Another characteristic of the growth in this culture was a slight turbid foamy appearance on the top of the culture-fluid. It disappeared when the tube was shaken, and, if the culture were already three or four days old, it did not reappear. Hoefflich records this growth, but the writer was not able to make pure cultures from this zone, and found that there was also present in such cultures an abundance of *Bacillus fluorescens liquefaciens*. This is not surprising, as the material for these cultures was,

though repeatedly washed, taken direct from Possil Marsh. As Hoefflich, however, worked with undoubtedly pure cultures, it seems as though the same appearance was produced by both organisms.

As the flecks proceeded in their growth they occupied more and more space in the liquid but never joined together. A large number of them fell to the bottom, forming there a flocculent mass. For a more exhaustive account of the growth in this medium reference must be made to Hoefflich's work (*Oesterreichische Monatsschrift für Theirheilkunde*, February, 1901), where it is exhaustively treated.

For the growth in solid media the best is undoubtedly the same as just mentioned, with the addition of about 5 to 6 per cent. gelatine, the medium being prepared in the usual way as regards filtering, clarifying, &c. The reaction must be either neutral or very faintly acid.

GELATINE-PLATE CULTURES.—As the writer's studies on the artificial cultures are not yet complete, the following account of them is taken from Hoefflich's investigations. At ordinary room temperature, after 12 hours, colonies consisting of straight or spiral threads, begin to appear, and after $1\frac{1}{2}$ days whitish irregular specks on the gelatine indicate that considerable growth has already taken place. As they grow still further, the colonies become surrounded by a foamy aureole, consisting of radiating threads. The central part is now a structureless mass, caused by a massing together of a considerable number of threads. Later the gelatine becomes liquefied, although a complete liquefaction of the gelatine is very seldom accomplished. Usually each colony is surrounded by a thin circle of liquefied gelatine, but complete liquefaction only takes place when inoculation of the plates is made from material taken from an old liquefied stab-culture. In such cases the plates are completely liquefied in 8 days, the gelatine becoming a thick, sluggish liquid.

GELATINE STAB-CULTURES.—In these cultures no growth could be ascertained on the surface of the gelatine, which is remarkable when one considers that the plant is an obligate aerob. The same general characteristics as mentioned above are shown. Along the stab-canal there appear either round whitish specks of the same nature as those in the bouillon cultures, or else the

stab-canal assumes the appearance of a test-tube brush, a large number of fine "bristles" radiating in all directions from the stab-canal.

After eight to ten days the upper surface begins to liquefy; liquefaction sets in gradually from the top downwards. The liquefied gelatine assumes a brownish or greyish colour, but is always clear and transparent. When liquefaction is complete, a flocculent whitish mass is found at the bottom of the tube.

The following media, commonly used for the cultivation of other bacteria, are quite useless for the cultivation of this organism :—

1. Broth made up of flesh-water, peptone, and common salt.
2. Solid medium made up of flesh-water, peptone, salt, and gelatine.
3. Solid medium made up of agar-agar and flesh-water.
4. Solid medium made up of flesh-water, glycerine, and agar-agar.
5. Solid medium made up of flesh-water, glycerine, blood-serum, and agar-agar.
6. Milk, potatoes, potato-water, hay and straw infusions.

THE STAINING OF CLADOTHRIX DICHOTOMA.—The writer found that a solution of iodine in potassium iodide (2 grams I : 1 gram KI : 200 c.c. water) was on the whole the best. By this reagent the sheath is rendered distinctly visible by the slight contraction of the cells which takes place; the cell membrane is stained a deep brown, whilst the cytoplasm takes on a yellowish brown tint. Most of the usual bacteriological stains are also suitable, and when any one particular structure is to be studied, some are better than iodine. The following stains may also be recommended :—A solution of gentianviolet (1 part gentianviolet, 10 parts alcohol, 90 parts water); carbolfuchsin (2 parts fuchsin, 10 parts alcohol, 90 parts of a 5 per cent. solution of carbolic acid). Not so good as the above are methylene-blue, bismarck-brown, and methyl-violet. For the examination of the sheath the following methods can be recommended :—Leave the material for about 5 minutes in ether, then stain with iodine. Although the sheath is not stained, the contraction of the cells occasioned both by the action of the ether and of the iodine, makes the

sheath stand out prominently, or, a dye which stains the sheath may be used, and the best for this purpose is night-blue stain, which is made up as follows :—Dissolve $\frac{1}{2}$ gram M'Crorie's night-blue in 20 c.c. abs. alc. Dissolve separately 1 gram tannic acid in 20 c.c. hot water, and 1 gram alum in 20 c.c. cold water. After solution mix the tannic acid and alum and filter at once. Add stain slowly to latter under continual gentle shaking. This method has the further advantage of also demonstrating the cilia, although it cannot be relied upon to show up any details of cell-structure.

CILIA-STAINING.—Care must be taken that the slide is *absolutely* clean. Then a small quantity of the material is put in a small drop of water which has been placed on the slide. The drop is allowed to dry at room-temperature, after which the night-blue stain, prepared as above and filtered before use, is placed on the cover-slip. The stain is allowed to act for about 4 minutes at room-temperature, when it is washed off, and the cover-slip allowed to dry.

The examination of the details of cell-structure requires great care. The material should be fixed either in a 2 per cent. solution of alum, or a 2 per cent. solution of corrosive sublimate, then stained very gradually with iodine. The writer obtained the best results by carefully and gradually staining in the wet condition, perfectly fresh material, before any deterioration had taken place. In this way the cells are still living, and being also very slightly stained, are well adapted for this kind of observation.

PHYSIOLOGICAL CONSIDERATIONS.—As stated above, *Cladotrix dichotoma* grows in ferruginous and non-ferruginous waters, though it is usually treated with the Iron-bacteria on account of its common occurrence in iron waters. It is essentially a saprophytic organism, growing only where dead organic matter is present. It seems to be able to thrive well under conditions in which the supply of organic food is so small that other saprophytic bacteria cannot increase their number to any great extent. It is never found in waters in which there is no organic matter in process of decomposition, so that it is not a prototrophic organism. At the same time it is strange that, such being the case, it should thrive well when supplied with flesh extract and

not grow at all when peptone and salt, which are greedily taken up by saprophytic bacteria, are presented to it. When growing in ferruginous waters, unlike the other Iron-bacteria, there is very little, if any, deposition of ferric hydroxide. The two hypotheses which hold the field at present are that of Winogradsky and that of Molisch, and the behaviour of an allied organism which does not store iron becomes interesting, because it may throw some light on the rival hypotheses. Winogradsky claims that, as the iron comes out of the earth in the form of the soluble bi-carbonate, viz., $\text{FeH}_2(\text{CO}_3)_2$, the process may be represented as follows:— After absorption the $\text{FeH}_2(\text{CO}_3)_2$ is oxidised by the plant and a soluble ferric-compound formed. This is thrust outside, where it is gradually changed into the insoluble ferric hydroxide. He holds it as probable that, after the oxidation, a neutral ferric salt of some organic acid is formed, which, after being thrust out, becomes gradually more basic, being finally changed into ferric hydroxide in which form it is stored on the sheath of the organism.

Molisch, on the other hand, regards the whole process of Iron-storing as the work of a plant-filter. As the water from the surrounding fluid passes into the plant, the iron-constituents are kept back by the sheaths of the organisms and retained there. The iron is gradually changed into the insoluble condition on the sheath, the process taking place entirely through the agency of the atmospheric oxygen. Against Winogradsky's hypothesis it may be said that he has not brought forward a single fact to support it, and it has been found by subsequent investigators that these organisms do not need iron in any way, and grow quite as readily in non-ferruginous as in ferruginous waters. On the other hand, Molisch's hypothesis is not free from objections, for, if the plant acts merely as a filter, why should *Cladothrix dichotoma*, though possessing an excellent sheath, capable of acting as a filter, show scarcely any trace of iron when it is growing in ferruginous waters. There must be some selective action on the part of the protoplasm as a result of which some of the Iron-bacteria attract to themselves a greater quantity of the iron compound than others. Again, it is difficult to see how these organisms should be able to prevent *soluble* iron-salts from passing through, whilst other salts are allowed to enter the plant. The whole question must still be regarded as not completely solved.

Notes.

Flamingo (*Phoenicopterus roseus*) in Clyde Estuary.—The Flamingo referred to in our last number (*ante* pp. 35-6) is reported to have been killed on the Renfrewshire side of the estuary, off Port-Glasgow. It is now in the M'Lean Museum, Greenock.—John Paterson.

Teal (*Nettion crecca*) from Denmark, shot at Glenorchard.—On the evening of 20th December, 1910, I shot a Teal drake at Glenorchard, which had a ring on its left leg marked H Chr. C. Mortensen, Viborg, Denmark, 1045Y. It was ringed on October 19th, 1909, at Isle Fanö, S.W. Denmark, where it was caught that day in a duck decoy.—James Bartholomew, *Kinnelhead, Beattock*.

Review.

The Liverworts: British and Foreign.—By Sir Edward Fry, G.C.B., and Agnes Fry. Witherby & Co., London; 2s. 6d. net.

The dearth of literature in English on the subject of the Hepaticæ, and particularly the want of a good introductory handbook devoted exclusively to the group, is perhaps largely responsible for the neglect of these very attractive plants by the majority of botanical students. We therefore welcome this little book from the pen of Sir Edward Fry, which combines accuracy of detail with interest and readability. Into the short compass of seventy-four pages the author has succeeded in condensing a good general account of the whole group, without unduly curtailing any essential part of the subject. Starting with a comparison of the two forms of the plant-body occurring in the Liverworts, as illustrated by two well-known species—the frondose *Pellia epiphylla*, and the foliose *Diplophyllum albidum*—he proceeds to compare with these the different divisions of the Hepaticæ, the various groups being illustrated, for the most part, by familiar examples. The derivation of the more complicated forms from a simple type is very well worked out, and the facts stated in such a manner as to engage and retain the

interest of the reader. The account of *Marchantia* is particularly well done, especially the explanation of the rather complex morphology of the archegoniophore and antheridiophore. As regards the Jungermanniæ we should have liked to see the different divisions of the group more fully dealt with. This is, admittedly, a somewhat difficult subject; but it is precisely here that the novice requires guidance for the understanding of the relations of the various genera. The arrangement, for example, of the leaves in three ranks, of which two are dorso-lateral, and one medianly ventral, might be regarded as a type from which such apparently diverse forms as *Frullania* and *Tricholea*, or *Porella* and *Ptilidium*, may be derived. This variety amid uniformity, with the different forms falling naturally into groups or sub-types, is perhaps nowhere better seen than in the foliose Jungermanniæ, and, if worked out in more detail, would form an instructive object-lesson in morphology. In this same connection, also, we may be allowed to express a feeling of some regret at seeing continued the objectionable use of the term "stipules" to designate the ventral row of leaves, or "underleaves" as they have been more happily called. Another point we should have liked to see more clearly emphasised is the essential structural difference between the air-pores ("compound stomata" of the older text-books) of the Marchantiæ, and the true or simple "stomata"—always confined to the sporophyte—of *Anthoceros*, the Bryineæ Ferns, and Phanerogams. The book does not, of course, profess to be more than an introduction to the subject; and no attempt is made to furnish diagnosis of genera or species. As a handbook for the beginner, however, it can be confidently recommended for use in connection with any of the existing floras, such as Lett's "British Hepaticæ" or Macvicar's "Key." The concluding chapter gives useful references to a number of the principal works on the special subject. The book contains forty-nine wood-cut illustrations from drawings by Miss Agnes Fry, all of which are excellent, both as regards clearness and fidelity to nature.—J. R. L.

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[May, 1911.]

ROBERT SERVICE.

ROBERT SERVICE, nurseryman, a former member of this society and in recent years a contributor to our *Proceedings and Transactions*, died at his residence, Janefield, Maxwelltown, Dumfries, on 8th May, 1911, in his fifty-seventh year. He was born at Netherplace, Mauchline, Ayrshire, where his father was at the time gardener, and was buried in Troqueer Parish Churchyard, Dumfries. When he appeared before the committee appointed by the Board of Agriculture to investigate the vole plague in the south of Scotland, the chairman, in his opening question, asked Mr. Service if he "had studied natural history for some time?" "Yes, ever since I was a child," was his reply, and the child proved the father of the man. He was one of those who illustrated a remark once made to the present writer by one of our old members, the late Mr. Henry Grieve, "the longer I live, the more I see that naturalists, like poets, are born, not made." Very many things claimed his attention, and he had many interests, but the ruling passion of his life and his chief intellectual preoccupation was the natural history of the Scottish Solway, with which he was almost exclusively associated from his fourth year, by which time his father had settled in Dumfries.

From his early manhood till near his death, for a period of forty years, Mr. Service may be said, so far as its natural history is concerned, to have dominated the Solway area, in a way that it has not been given to any other naturalist to do, in any other area in Scotland, with one remarkable exception. If the sparseness of the population in the Solway region made this achievement easier than in a more populous centre, Mr. Service's performance was still remarkable. Circumstances and inclination combined to encourage him to cover a wide field of human and natural history interest, and, as his information was encyclopædic, he became a kind of universal referee to all who made pilgrimages to Dumfries.

Mr. Service was well known personally in Scottish natural history circles, as he was at one time or another a member of several Glasgow and Edinburgh societies, and naturally was intimately associated with the work of the Dumfriesshire and Galloway Natural History and Antiquarian Society, of which he was the Secretary from 1876 to 1882. At the meetings of these societies his appearances were very welcome, and he has enriched their *Transactions* by publishing through that medium many papers of permanent value. He contributed notes regularly, and papers occasionally, to the *Annals of Scottish Natural History*, and in the *Zoologist* also are to be found several of his papers. In addition to these contributions to scientific journals and the Proceedings and Transactions of learned societies, he wrote regularly, chiefly on natural history subjects, in the columns of the *Dumfries and Galloway Courier and Herald*, the *Kirkcudbrightshire Advertiser*, and the *Dumfries and Galloway Standard and Advertiser*. Among the writer's most cherished possessions, is a volume, composed of these fugitive communications to the press, which he received in 1897 "from Mabie Moss," the *nom de guerre* under which Mr. Service wrote extensively. His chapter on the Vertebrate Zoology of Kirkcudbrightshire, in Maxwell's *Guide Book to the Stewartry of Kirkcudbright*, shows the familiarity he had with this great group of the animal kingdom, as represented in the Scottish Solway. As is well known, he did a great deal to fill up from first hand knowledge, details of the distribution of species in Mr. Gladstone's important work on the Birds of Dumfriesshire. Among distinguished ornithologists of the last generation with whom he was in more or less regular communication, were Count Tschusi zu Schmidhoffen, of Salzburg, Professor Newton, of Cambridge, the Rev. Hugh A. Macpherson, and Howard Saunders. He was for some time a member of the British Association for the Advancement of Science and the British Ornithologists' Union, and was a corresponding member of the Yorkshire Naturalists' Union. He was offered the post of Naturalist in the expedition which Joseph Thomson undertook to Eastern Africa on behalf of the Royal Geographical Society, but was persuaded by his parents to decline the invitation. He gave evidence before the Vole Plague Commission, the Solway Fishery Commission, and at the

inquiry "which resulted in the construction of works for the purification of Dumfries and Maxwelltown sewage, he was examined regarding the effect on fish-life of various forms of river pollution." The naturalist in Mr. Service did not succeed in absorbing the whole man. He wrote articles in the *Dumfries Standard* under the title "Amongst other worlds, by an Amateur Astronomer," and was one of the first half-dozen to observe the new star which appeared in Perseus in 1901. He was a shareholder and for many years secretary of the Dumfries and Maxwelltown Observatory Company. For a short period he was a member of the Town Council of Maxwelltown, and of Troqueer Parish Council. He served some years in the Dumfries Volunteers, and took an active part in cycle road racing when that sport was popular. His political friends claimed him as "a good Tory of the orthodox type," . . . "a strong man in the political field, that never wavered." His political opponents, who were in many cases fast personal friends, had their own views regarding the circumstances which, in their opinion, made for limitation in his political development. Naturally, he was prominent in horticultural circles, acting for many years as chairman of directors of the Dumfries and Galloway Horticultural Society, and as recently as September, 1910, he was judging roses at the show of the Royal Horticultural Society of Scotland in Edinburgh.

Mr. Service was endowed with a fine physique, and but for the illness which business worry precipitated, might have continued in vigour for many years. He had a virile mind, and without conscious literary instinct, wrote with an ease which was probably as real as it was apparent. He was a delightful correspondent. Though claiming to be averse to controversy, he did not shirk it, and was a doughty opponent, from the extent of his experience and the vigour of his mind. He wrote to me on one occasion:—"You see from above I am in a controversy—I do not like controversy. Your opponent always does obscure the truth so!" He had some reputation as a *raconteur*, and those who knew him well will long recall the peculiar brightness of his eyes, when, as often happened, he saw with a fine sense of humour below the surface of things. Devoid of any affectation, his manners were easy and he made the pleasantest of companions.

But all this is past—a darkness has fallen for many of us upon the shores of Solway. His “days are past,” his “purposes are broken off.” It would have been a satisfaction to himself and a great convenience to his contemporaries, and to later generations, had he been able to give a full and connected account of the vertebrate fauna of Solway, but this was a task difficult of accomplishment to one in his situation. The list of some of his published papers appended hereto, with their sources, may be useful.

J. P.

LIST OF THE MORE IMPORTANT PAPERS BY ROBERT SERVICE.

1. Disappearance of the Chough (*Pyrrhocorax graculus*, L.) from the Stewartry of Kirkcubright. *Proc. & Trans. Nat. Hist. Soc. of Glasgow*, I. (N.S.), 1884-5, pp. 117-122.
2. Wild White Cattle in South-western Scotland. *The Zoologist*, December, 1887.
3. On the former existence of Ptarmigan in South-west Scotland. *The Zoologist*, 1887.
4. The Old Fur Market of Dumfries. *Scottish Naturalist*, July, 1891.
5. The Freshwater Fishes of the Solway Area. *Loc. cit.*, 1892.
6. Mammalia of Solway. *Annals of Scot. Nat. History*, 1896, pp. 201-210.
7. The Vertebrates of Solway: A Century's Changes. (Printed for private circulation.) 1901, pp. 1-23.
8. The Vertebrate Zoology of Kirkcubrightshire. Maxwell's *Guide Book to the Stewartry of Kirkcubright* (Seventh edition). Reprint in my possession bears the author's note “Revised to May, 1902.”
9. Colour Variations in Solway Mammals. *Annals of Scot. Nat. History*, 1903, pp. 65-69.
10. Bird Migration in Solway. *Loc. cit.*, pp. 193-204.
11. The Bittern. Reprinted from *Kirkcubrightshire Advertiser* of 19th December, 1902, pp. 1-8.
12. The Diurnal and Nocturnal Raptorial Birds of the Solway Area. Reprinted from the *Dumfries and Galloway Courier and Herald* of 19th December, 1903, pp. 1-19.
13. From a Solway Note-Book. *Annals of Scot. Nat. Hist.*, 1904, pp. 65-71.
14. The Sylviidæ of Solway. *Trans. Nat. Hist. Soc., Glasgow*, VII. (N.S.), 1905, pp. 137-147.
15. The Rarer Birds of the Solway Area. Reprinted from the *Dumfries Courier and Herald* of 22nd and 26th April, 1905, pp. 1-15.
16. The Waders of Solway. *Trans. Nat. Hist. Soc., Glasgow*, VIII. (N.S.), 1908, pp. 46-60.
17. The Bar-tailed Godwit as a Solway Bird. *Annals of Scot. Nat. Hist.*, 1908, pp. 85-86.

LABORATORY AQUARIUM NOTES.

BY JAMES F. GEMMILL, M.A., M.D., D.Sc.

[Read 28th February, 1911.]

I. New Clyde Polychæte records, (a) *Leucodore* (*Polydora*) *ciliatus*, Johnston; (b) *Ophryotrocha puerilis*, Claparède and Metschnikoff; (c) *Amphitrite johnstoni* (Malmgren).

(a) *Leucodore ciliatus*, Johnston, belongs to the Polydoridæ, a small family of the Spionid polychæte worms (*Cambridge Nat. Hist.*, II., p. 323). It was first described by Johnston in his *Catalogue of the Non-parasitical Worms in the British Museum*, 1865, p. 204. Summary of characters—

Branchial cirri confined to middle of body, absent at either extremity; tentacles shorter than in *Spio*; first four somites behind the buccal bearing acicular setæ only; in fifth somite the dorsal setæ are much elongated uncini, only the points projecting beyond the skin; branchial cirri on segments following the fifth, the first being very small; an infundibuliform membrane incomplete dorsally surrounding the anus (Cunningham and Ramage, *Polychæta Sedentaria of the Firth of Forth*, *Trans. Roy. Soc., Edin.*, XXXIII., 1888, p. 641).

The Polydoridæ are distinguished from all other polychæte worms, except the Chaetopteridæ by the fact that the chaetæ of the fifth bristle-bearing segment are different in shape from the others, and are much stronger.

This species may be found practically anywhere around Millport, on old shells, among barnacle incrustations, &c., particularly if the material be examined at leisure in the living condition, with the help of a lens. The two tentacles are in continual vibracular movement, and attract attention to the short brown tube of cemented mud from which they emerge and which in turn is set on the end of a gallery in the substance of the shell. The galleries are said to be U shaped, with two openings, each opening being prolonged by a tube. I could not find that this was always the case, as in some of the instances which I examined carefully, there appeared to be only one external opening. The whole worm is small, the largest Millport specimens measuring less than half-an-inch in length, while their projecting mud tubes

are from a sixteenth to an eighth of an inch in length, and about a thirty-second of an inch in diameter. While this species takes advantage of galleries already excavated, or even of narrow open crevices to live in, there can be no doubt that it is able to bore tunnels for itself. How this is done by different species of worms is an interesting question. Here probably an acid secretion is formed, which softens the limy substance of the shells in which the animal is so often found. When it inhabits a crevice, its mud tube is continued in and out of the crevice forming the entire length of its U-shaped gallery.

(b) *Ophryotrocha puerilis*, Claparède and Metschnikoff. This small polychæte was first described by Ed. Claparède and Elias Metschnikoff (*Beitr. z. Erkenntniss der Entwicklungsgeschichte der Chaetopoden* in *Zeit. f. Wiss. Zool.* XIX., p. 884, T. XIII.). Later a very full account of its structure was given by E. Korschelt in the same *Zeitschr.*, LVII., p. 225, T. XII.-XV., and of its development by F. Braem (*Ibid.*, p. 187, Taf. X.-XI.).

It belongs to the Eunicidæ (*Cambridge Nat. Hist.*, II., p. 318), one of the families of the Nereidiform polychætes, and its most interesting and remarkable peculiarity is the possession of an annulus or girdle of cilia in each body segment. This is an embryonic character persisting throughout adult life. Other characteristics are:—the head segment has two transverse ciliated bands, two eyes and two ciliated pits, as well as a dorsal and a ventral pair of tiny feelers. The pharynx is provided with powerful jaws, which in the retracted condition show up through the half transparent body wall, as a dark diamond-shaped mark. The number of body segments varies, being as a rule about twenty-eight; the first two are without setæ, while the last one carries three short setæ, but no parapodia. According to Korschelt, male, female, and hermaphrodite individuals occur.

Like *Leucodore* this worm is very small, its length being about quarter of an inch. It turns up regularly after a longer or shorter time in most small aquaria, and I have usually found that its appearance openly on the sides of the aquarium announces the demise, either imminent or already accomplished, of some of the inhabitants. Possibly an unhealthy condition of the water prompts it to leave the fastness it may have lain concealed in for months. But this will hardly explain everything, since it is able

to live and multiply in water, which judged by other tests is of a supreme degree of unhealthiness. Anyhow, from experience, I have come to dread the sight of it, and only the other day the unexpected appearance of one in a small vessel, containing the second last survivor of my 1910 *Solaster* brood, led me to look carefully at this precious specimen, and sure enough to find that it was moribund. The *Ophryotrocha* had been introduced unawares months before, along with some small fragments of shell carrying fine algal growths which I had supplied with the intention of providing food for the *Solaster*.

(c) *Amphitrite johnstoni* (Malmgren) belongs to the Terebellidæ, a large and important family of the polychætes (*Cambridge Nat. Hist.*, II., p. 327). It is in all probability the species to which the name *Terebella nebulosa* was applied by Johnston (*loc. cit.*, p. 327), but the first adequate account of it was given by Malmgren (*Nordiska Hafs-Annulater, Öfversigt Kong. Vet. Ak. Forh.* 22, 1865, p. 377). More accessible is the description by Cunningham & Ramage (*loc. cit.*).

There is a pair of gills on each of three successive segments. The gills are sub-equal, and each begins with a short main stem giving rise to a number of branches which again subdivide, the terminal divisions being rather long and thin as well as slightly curled. Twenty-four pairs of notopodial fascicles occur, the first being on the third gill-bearing segment. The first thirteen or fourteen post-buccal somites are provided with ventral gland shields.

The number and shape of the gills and the number of the notopodial fascicles form convenient characters for distinguishing the Clyde Terebellids with which *Amphitrite johnstoni* may most readily be confused. *Amphitrite cirrata* (Müller) has seventeen pairs of notopodial fascicles, and three pairs of sub-equal gills, while each gill consists of a great many spirally coiled filaments mounted on a short common stem. *Terebella daniellseni* (Malmgren) has also seventeen pairs of notopodial fascicles and three pairs of gills decreasing in size posteriorly, but the latter have a considerable degree of dichotomous branching. *Nicolea venustula* (Montagu) has two pairs of equal branching gills and seventeen pairs of notopodial fascicles. *Thelopus circinnatus* (Fabr.) has notopodial fascicles on all the body

segments except the first two, which carry filiform gills set in transverse series. The common sand mason, *Lanice conchilega* (Pall.) is easily recognised by its habitat and by the characters of its tube, as well as by the fact that it possesses three pairs of branching gills and seventeen pairs of notopodial fascicles, while eye spots are absent, and the ventral gland shields, fourteen to seventeen in number, run into one another so as to form a continuous red strip from segment to segment.

Amphitrite johnstoni should not need to be a new Clyde record. I had obtained and identified it at Millport many years ago, but somehow or other it was omitted from my British Association list of the Clyde Polychætes (in *Handbook of the Nat. Hist. of Glasgow and West Scot.*, page 359, 1901).

This species lives readily in small aquaria under aeration. The tube, which is of mud, is by no means strongly or carefully put together, but on the other hand it can be added to with wonderful rapidity and industry when new material is supplied. It is most interesting to watch the manner in which particles are hunted for and picked up by the tentacles, and are then carried by peristaltic action towards the mouth along the deep transportation groove with which each of the tentacles is provided.

II. *Rearing aquatic larvæ*.—Dr. Gemmill showed contrivances for securing aeration and circulation in small aquaria containing sterilised Miguel sea water infected with a nutritive diatom culture, and adapted for the rearing of *plankton* larvæ and other similar organisms.

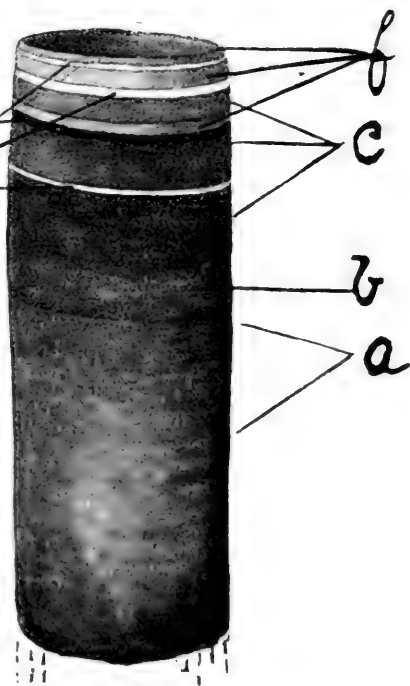
III. *Tube building in Sabella*.—The habits of the *Sabellid* polychæte worms have long been an interesting subject of study to those who take pleasure in marine aquaria, the animals in question being particularly easy to keep alive even in water which receives only a moderate amount of care. By supplying various materials, the lecturer induced specimens to add rings of differently coloured substances to the upper ends of their tubes. A tube was shown on which eleven different rings could be seen, viz., mud (four, brown), kaolin (three, white), kieselguhr dyed with safranin (red, three), and finely powdered charcoal (black, one).

As might be expected the animal built most willingly and industriously with the material first named, stretching out its plume of tentacles to their fullest as if inviting further supplies. Next in order of preference came kaolin, and next kieselguhr. As for the charcoal, I gave only a small dose, and this was

followed by the formation of a narrow ring, but the worm was afterwards very languid and kept its tentacles retracted for a time. However, it recovered all right, lived happily for some months longer, and added five or six rings though not of charcoal to its tube. It is matter for lasting regret to me that I then rashly ventured to repeat the black dose. After a strenuous attempt to add this also to the up-building of its home, the poor *Sabella* hung its limp plumes over the highest parapet of its castle, and surrendered its vague and kindly animality to the countless smaller, but fiercer entities which were its co-inhabitants of the aquarium.

A portion of the various materials was also swallowed by the animal in each experiment, appearing again surrounded by a skin of mucus within the sausage-like faecal masses, which, after travelling up from the posterior end of the body along the faecal groove, were ejected from time to time by way of the open end of the tube. There was evidence that the progress of material through the intestinal canal, was much more rapid in the case of charcoal and kieselguhr, than in that of kaolin or of Fairlie mud.

Upper end of tube of a *Sabella pavonina*, Sav. showing rings (*b* to *f*) added in captivity; *a* indicates what was the upper end of the tube originally, i.e. when the experiment started. This portion is made up of the fine dark brown bottom mud to be found in Fairlie Channel at or about twenty fathoms deep; *b*, a zone built from the first mud supplied to the animal in captivity, and rather lighter in colour; *c*, zones built up of the dark brown Fairlie mud supplied later; *d*, zones of kaolin clay (white); *e*, a zone of fine charcoal; *f*, zones of kieselguhr stained with safranin (red).



Occurrence at Ardrossan of the Corky-Scab Potato-Disease, *Spongospora scabies* (Berk.) Mass.

By D. A. BORD.

[Read 28th March, 1911.]

THROUGH the kindness of Mr. William Hogarth, Whitlees, Ardrossan, I had an opportunity last December of examining some potatoes, which were very much disfigured by patches of scab extending over the greater part of their surface. These tubers, he informed me, were part of a supply obtained from a neighbouring farm, and were intended to be placed in boxes until sufficiently sprouted, and afterwards planted for a late crop. As very many of the potatoes so obtained were similarly affected and presented other unusual features, Mr. Hogarth suspected the presence of one of the various fungus-parasites which have recently been brought prominently under the notice of farmers by the Board of Agriculture and Fisheries. Some specimens of the potatoes were accordingly submitted to the Board for examination, and these have since been reported on as affected with the disease known as "Corky-scab," occasioned by *Spongospora scabies*.

Although the parasite appears to have been known in this country for nearly seventy years, its nature and life-history have been very imperfectly understood by British mycologists. It was first described and figured by Berkeley,* who regarded it as belonging to the group known as the Ustilaginæ or "Smut-fungi," and named it *Tubercinia scabies*. He described its spores as "subglobose, composed of minute cells, forming together a hollow globe, with one or more lacunæ, generally attached laterally by a slender thread, olive." This diagnosis continued to be accepted by Cooke, Plowright, and others, until recent years. Massee, however, followed Fischer de Waldheim in assigning the parasite to *Sorosporium*, another genus of Ustilaginæ; and he remarked that "it is not very injurious, and in fact is often considered as a sign that the potato attacked is

* *Journal of the Royal Horticultural Society*, Vol. I. (1846), p. 33; figs. 30, 31.

good and floury," but that when present in large quantity it depreciates the market value of the affected tubers.* Cooke also refers to this species under the name of *Sorosporium scabies*. He remarks that often no trace of the fungus is visible at the time of harvesting, but it frequently shows itself during winter in stored potatoes which at digging appeared to be quite sound. In bad cases discoloured spots first appear, and these increase in size and become confluent, until at length the entire skin is discoloured; then the cuticle bursts and the spores are set free.†

The life-history of this parasite was investigated in Norway by Brunchorst, who, in 1886, published an account of his researches. He found that the organism was not one of the Ustilagineæ, as had formerly been supposed, but a member of the group known as the Myxomycetes or Mycetozoa. It was accordingly described by him under the name of *Spongospora solani*. Brunchorst's investigations have more recently been followed by those of Massee and others in this country.

As the parasite was conclusively proved to be capable of occasioning serious loss to potato growers, the importance of the subject has been recognised by the Board of Agriculture and Fisheries, who have issued a leaflet (No. 232) descriptive of the corky-scab potato-disease.

The action of *Spongospora* on a potato tuber is stated to be very varied. Sometimes a considerable number of small superficial scabs, of a more or less circular form, are developed; while, in other instances, cavities of more or less extent are formed which become densely lined with a mass of spore-balls resembling snuff-coloured powder. These cavities are frequently much augmented in size through the operations of *Julus pulchellus*, a small millipede, and occasionally the whole interior of the potato becomes hollowed out. In other instances, the presence of *Spongospora* is shown by the formation of large projecting outgrowths of a more or less truncate form, which might readily be mistaken for "Black Scab."‡

* Massee, *Text Book of Plant Diseases caused by Cryptogamic Parasites* (1899), p. 225.

† Cooke, "Fungoid Pests of Cultivated Plants," in *Journal of the Royal Horticultural Society*, Vols. XXVII.-XXIX. Separate issue (1906), p. 92.

‡ Massee, *Diseases of Cultivated Plants and Trees* (1910), page 529.

In its earliest stage, *Spongospora* appears in the young potato cells, just below the surface of the tuber, in the form of uninucleate myxamœbæ, which increase in number, and become the medium for conveying the disease from one cell to another. This is effected by some of the myxamœbæ passing from the mother-cell into the daughter-cells in the meristematic tissue. Towards the close of the vegetative phase, the amœboid bodies become grouped about the nucleus of the host-cell, and coalesce so as to form a plasmodium. After the contents of the host cell—starch, protoplasm, and nucleus—have been used up as food, the plasmodium passes from the vegetative to the generative condition. Its outer wall becomes converted into a layer of cells or spores, thus forming a spore-ball of a snuff-brown colour and sponge-like appearance. Further details regarding the life-history and cytology of *Spongospora* will be found in Mr. Massee's last-cited work, where the various stages in the development of the parasite are fully illustrated, and in two recent papers by Messrs. T. G. B. Osborn and A. S. Horne.*

The plasmodium of *Spongospora* appears to be only active during the period when the tuber is growing. It accordingly passes into a resting condition when the tuber becomes dormant during the winter; but, in the spring, when the tuber begins to sprout, the plasmodium resumes activity, and the disease passes from the old tuber into the new ones which are formed during the process of growth. The *Spongospora* is thus transferred from one generation of potato-tubers to another without leaving the host. Many of the spore-balls from diseased tubers pass into the soil, and, as it has been proved that land containing such spore-balls will continue to yield a diseased crop, it is evident that the spore-balls must retain their vitality in the soil for at least one season, and be capable of infecting young potatoes.†

Corky-scab potato-disease is said to be very prevalent in the West of Ireland, and not uncommon in Scotland and the North of England, but much rarer in the south. It also occurs commonly in several continental countries. It does not seem to have previously been reported from the Clyde Area.

* In *Annals of Botany*, Vol. XXV., No. 97 (January, 1911), pp. 271, 272.

† Massee, *l.c.*, page 529.

As regards remedial measures, dressing the land with quicklime and treating the diseased tubers with formalin have both been recommended, but doubts have been expressed as to the efficacy of these remedies in particular cases. According to the Board of Agriculture, the use of lime has sometimes appeared to aggravate rather than allay the disease, while a formalin wash must often fail to reach the affected tissues, especially when deep-seated in the tuber. Scrupulous care should always be taken to avoid the use of sets obtained from potatoes showing the slightest trace of infection; unboiled potatoes, if at all diseased, should never be used as food for pigs or other live stock; and much greater caution than is often displayed should be exercised in the disposal of the haulms and undersized tubers removed from the ground after digging. These are too frequently collected in heaps on the sides of the fields, where they are left to rot, and thus to become an active centre for the distribution of injurious spores and perpetuation of diseases which might, by the exercise of prudence and foresight, be speedily brought under control.

Since the above was written an important paper by Mr. T. G. B. Osborn, B.Sc., on "*Spongospora subterranea* (Wallroth), Johnson" [= *S. Scabies* (Berk.) Masee], has appeared in the *Annals of Botany*, No. XCVIII. (April, 1911), pp. 327-339, pl. xxvii., in which he gives a summary of present knowledge of the life-history of the species. He states that all his cultures of the spore balls have proved intractable, and that his own observations as to the transmission of the disease from infected "seed" or soil to sound "seed" potatoes have been entirely negative. He planted tubers of "Up-to-Date," "Factor," and "Conquest" in pots of infected soil, and side by side with infected "seed," under varying conditions of moisture and temperature, but in no case was he successful in inducing the disease. The precise mode by which infection is transmitted from diseased to healthy tissues has, therefore, not yet been clearly ascertained. These investigations, however, show *Spongospora* to be a member of the Plasmodiophoraceæ, a group which has many points of relationship to the Mycetozoa, and differs chiefly in the parasitic habit, the method of division of the vegetative nuclei, and by the less constant presence of a flagellum on spore germination.

Silver-Tree Seeds and Seedlings.

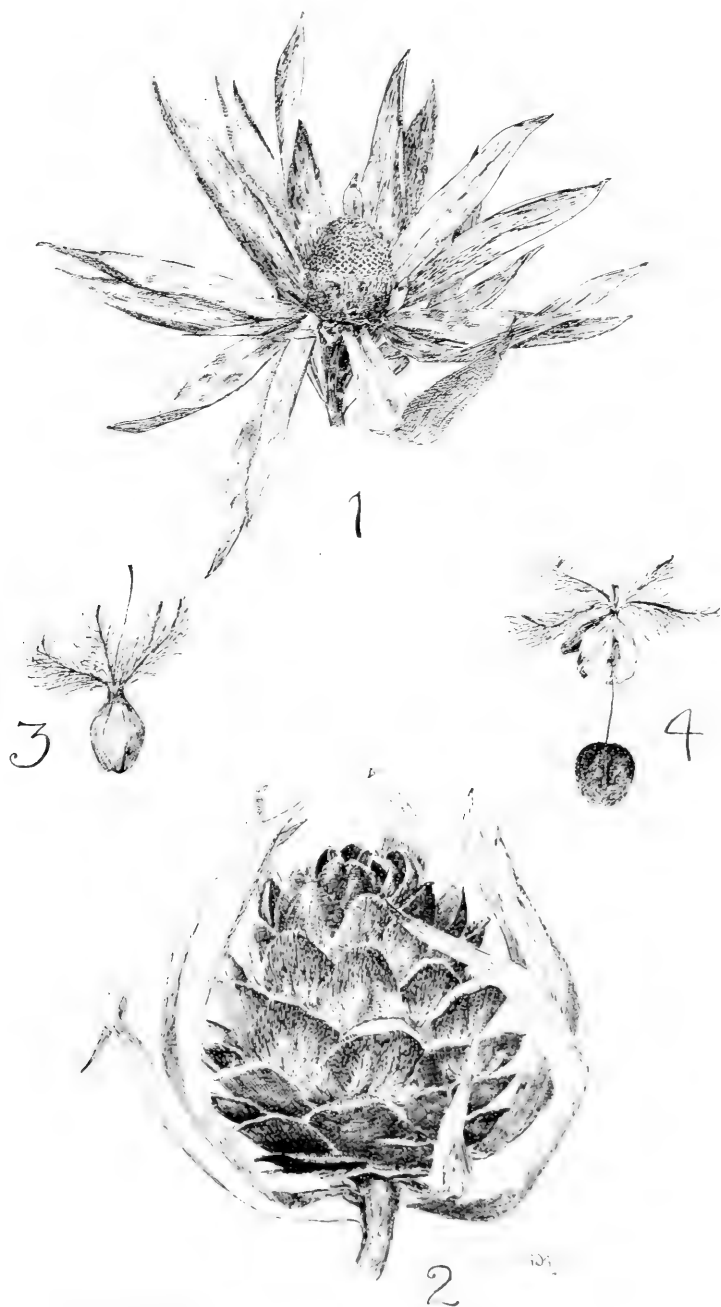
By R. S. WISHART, M.A.

[Read 25th April, 1911.]

The Silver-tree, *Leucadendron argenteum*, R.Br., is a native of South Africa, and it is probably indigenous nowhere except in the region about Table Mountain. From Cape Town, Paarl, Stellenbosch, and other places in that part of the colony, many people in this country have long been accustomed to get leaves sent them by friends. These leaves may be in their natural state as gathered, or they may have pictures of a ship, of Table Mountain or of some other South African scene, or some design painted upon them. The leaves are indeed well-known in Scotland, but not so the flowers. For years, I had been again and again getting small boxes of leaves, and this induced me to make a special request to some of my Cape friends to procure me specimens of the flowers. The first I got were sent from Woodstock about thirteen years ago, and some of them are included in the collection shown to night. No noticeable change has taken place in their appearance during that time.

From an acquaintance with the leaves only, one does not expect to find that the trees produce large cones similar to those of gymnosperms. The male and the female flowers grow on different trees, and both are produced in terminal heads with involucre, not unlike the inflorescence of the *compositæ*, and are further protected by abundant foliage leaves. In the case of the female inflorescence, while ripening is going on, the bracts that protect the flowers develop into hard scales, so that the inflorescence becomes to all purposes a cone (Plate I., fig. 2). These cones are as hard and tough as those of our pine or larch, and they grow to a considerably larger size. The largest of those exhibited herewith measure $9\frac{1}{2}$ inches in circumference, and their height is $3\frac{1}{4}$ inches.

The plant belongs to the *Proteaceæ*. Prantl, while he classifies this order along with the *Daphniales*, says that its affinities are doubtful. The *Proteaceæ* have four stamens which adhere to the



1. Male inflorescence of *Leucadendron argenteum* surrounded by foliage leaves. 2. Female inflorescence developed into a cone. 3. A nut enclosed by the calyx-tube. 4. Parachute arrangement of nut with calyx.



four segments of the perianth, and in this the Silver-Tree agrees with them; but it differs from the order generally, in having unisexual instead of hermaphrodite flowers. The flowers are dioecious, but not decidedly so. The males have a distinct although barren pistil; and attempts to form anthers and even pollen grains are sometimes found on the calyx lobes of the female flowers.

The cones differ from those of the *Conifere* in having their seeds angiospermous. The ovary is enclosed by a calyx tube which branches out at the top into four narrow segments clothed with long white hairs (Plate I., 3). The fruit is a nut with no endosperm, and the embryo has two thick fleshy cotyledons. When the fruit is ripe the calyx tube splits into four from the base, so as to slip over the nut as soon as it is blown out or begins to fall, and as the top of the tube remains entire around the style, the perianth slides along till it is stopped by the stigmatic knob at the top (Plate I., 4). The seeds are thus caused to descend or be wafted along in parachute fashion by this pretty piece of mechanism. The purpose of letting the parachute slip along the style so as to be some distance from the ovary, is probably to allow the seed the better to reach the ground through the ordinary herbage. If the feathery perianth were left close to the seed, it would be likely to keep it hanging on the short grass or other weeds among which it might fall, but with the long style intervening, the chance of safely reaching the soil is greatly increased, even if the parachute should be intercepted.

Seeds to be reared at home do not need to exercise their own ingenious devices. Ours were carefully planted in a flower-pot of vegetable mould, the first ones about October. No selection of season was made; they were put in just soon after we got them. The outstanding result that has to be recorded is that a very small percentage germinated at all. Several other attempts have been made, but the success has been no better. It does not appear that it matters much when the seeds are sown: if they are put in any time from August to December as ours have chanced to be, they just lie in the earth till the winter is over, and any of the seedlings that are to grow make their appearance after the spring has come. One thing that appears certain is that the seeds lose their vitality within a very few years. Out

of ten seeds planted in 1908 we became the happy possessors of one seedling which is still alive and doing well, after having completed its first two full years above ground. These seeds had been in the house for three years. After another year we made a big sowing of thirty seeds from which we did not get a single seedling. The results of these trials must be so far qualified by the probability that the cones may not have been properly matured when gathered. As to this I have no certain knowledge, but I suspect that the seeds may not all have been thoroughly ripe.

When we come to examine the growth and behaviour of our home-grown seedlings, we are on more certain ground. Even if we have to admit that, grown under unusual conditions, the plant may be forced to make modifications of the course it follows in its natural habitat, its life and development are none the less interesting, and the behaviour of our seedlings may be safely trusted to throw at least considerable light upon the general ways of the tree.

The specimen from which our notes are mainly taken, and whose ways and doings were carefully noted from time to time during its life of nearly five seasons, first showed its two cotyledons above ground in the spring of 1901. The plant germinates after the type of the Sunflower, *Helianthus*, the hypocotyl lengthening and raising up the cotyledons. In the seeds of the Silver-Tree, the cotyledons increase greatly in size during germination, and when they come to the stage of working as leaves they are much larger than might be expected from the seeds. These cotyledons do their best to act as the seedlings first leaves, although they are somewhat heavy and thick, but it is not long till other leaves are produced to help them. As in the case of most plants, the foliage leaves are considerably different in shape from the cotyledons; in this case they are longer in proportion to their breadth. During the first and second years the plant is at its prettiest. The phyllotaxis is of the five-rowed type, and each leaf so disposes itself as to form the whole leafy stem into a screw. The leaves do not stretch out horizontally, but they curve themselves backwards and tilt up one side higher than the other. If you put a thread to mark the course of the spiral in the phyllotaxis, the base of each leaf is

tilted up in the direction of the rising spiral, so that each one points upwards towards its next higher neighbour. If you have a plant in front of you it is towards your left hand that the higher edge is, on the side of the stem next you. By so disposing themselves the leaves present a very pretty screw arrangement which is best seen on looking from above downwards upon a seedling of the first year. The silky hairiness of the leaves adds to the beauty, and these white shiny hairs remain during the whole life of the leaf, and indeed after it, as we know from any dried specimens sent us from South Africa.

During the first season the plant grows one foot, and our seedlings have maintained a regular growth of just about a foot a year during the four complete years of which we have a record.

An important point to notice is that the leaves are not deciduous as might be expected from their appearance. Our seedling kept all its leaves in activity during the first three years, and indeed till the fourth was begun. Not even the cotyledons dropped off till the beginning of the fourth year, although they looked dead before the third was ended. During the fourth season the first year's leaves began to fade, and then to drop off, and, in a similar way, the second year's leaves began to fall during the fifth season. As far then as the evidence of our home-grown seedlings declares, the Silver Tree retains its leaves in a state of usefulness for three years, and sheds them during the fourth.

By the time that the first year's leaves are all away, and the second year's have begun to follow, the plant has lost much of its early beauty. The stem, when bare at the base and leafy only towards the top, is not nearly so graceful an object as when the whole is covered with numerous pretty white-haired leaves. Although I have at present no record farther than the fifth year, it is fair to infer that the plant will be still less attractive the more the bare portion exceeds that which is leafy.

During the first four years there was no attempt at branching, a feature which is rather unusual. The plant kept on growing to a length of four feet with one solitary stem, and as it was too slender to maintain an erect position it had to be tied to a support. It was after the fifth season had begun that the first commencement to branch was visible. This was a stage at which

the plant was watched with great interest. The branching had the same appearance at its beginning as that of an *Araucaria*, whose branches come out in a whorl at the top of the stem.

Just at this interesting stage came the misfortune that cut short our investigations. When we were away from home in July, the plant took ill and died. No cause could be assigned for this. We were assured that there had been no neglect in the watering, and no drowning, and there could have been in July no cold to cause any injury to the plant. I at once tried to restore the drooping leaves by syringing and gently sponging the stem and leaves, but it was to no purpose. After leaving the plant long enough in the pot to make sure that there was no chance of a new bud springing from it, I had reluctantly to give it up, and accept the verdict of "death from some unknown cause." The leaves were so twisted and crumpled that nothing satisfactory could be done with them, but, fortunately, the stem has been preserved, and it is shown here to-night to give some testimony of what has been. The leaf-scars are distinct throughout its length, and they show how leafy the stem was when growing. The hairs on the younger portions of the stem are still abundant and spreading just as they were when the plant was alive, but it may be noticed that much of the hairiness has disappeared from the portion representing the first year's growth, which had been entirely denuded of its leaves while the plant was still growing.

The representative which we are watching now at the beginning of its third year has up to the present behaved exactly as its predecessor did. The cotyledons may, however, have exhausted their efforts somewhat earlier, although they have not yet fallen off. All the other leaves are fresh and vigorous, and they do not look as if any of them contemplated a fall in the measurable future. It is now, at the middle of April, just over two years since this seedling's first appearance, and its length is fully 24 inches, and its number of leaves is about 130, besides those forming the terminal bud. This gives, approximately, $5\frac{1}{3}$ leaves to the inch, and measurements of the old dead stem show a similar distribution of the leaf-scars upon it.

The leaves of our seedlings are much smaller than those of the full-grown tree, which may exceed six inches in length, but this is not by any means an uncommon circumstance. With trees it is

the rule rather than the exception. In our plant, as measured to-day, the longest of its first year's leaves is only $1\frac{5}{8}$ inches, and its second year's $2\frac{1}{8}$ inches in length, and a similar progression was noticeable in our former record which we had up to the fifth year. From this it is evident that our home-grown seedlings from the first make for becoming trees, and have leaves developed to a size befitting the dignity of a tree.

The photographs of the various stages show the peculiar appearance which the seedling maintains during its early years, with one lengthening leafsystem, and no branches. No buds are shown in the axils of the leaves. Figure 1 is a photograph of a plant during its second year.

Our seedlings have been reared in an ordinary room, where there was seldom any fire. No particular care seems necessary to protect them from the cold of our climate as long as they are inside. Even in very severe frost they were only removed from their place at the window to the middle of the room, and they seem to enjoy their life and circumstances tolerably well all the year through.



Fig. 1.—Seedling in its second year.

Those who have access to the Silver Tree in its native habitat could, no doubt, tell us more and better about its life and growth, but our seedlings have tried to do their best to throw some light upon the early years and character of a tree which to us is a stranger. Although our record was cut shorter than we could have wished, it was long enough to enlighten us upon two

important points, (1) that the Silver Tree retains its leaves on duty over three seasons, and (2) that branching begins in the fifth year from the apex of the fourth year's growth. The branching, indeed, commences just after the first year's leaves have been shed.

The Return of Summer-Birds to the "Clyde" Area in 1911.

BY JOHN PATERSON.

THE spring migration of 1911 opened in rather disappointing fashion, owing, probably, to the persistent strong cold winds from the north-east which prevailed for the first fortnight in April. Easter week-end (15th-17th April) saw a change of conditions, and a decided change to a higher temperature which marked the afternoon of 17th April was maintained until all the summer-birds had returned. The results of this year's investigations seem to reflect the conditions which obtained, by late appearances in the first fortnight of April and early appearances thereafter.

Comparing this year with last, till 14th April inclusive, the sum of days later for seven species is 31 days, and earlier, for two species, seven days. Following thereupon, the sum of days later for two species is but 8 days, and of days earlier for four species 31, so that the positions in the two periods are reversed. The species reported in 1910 till 11th May inclusive numbered 16, in 1911 till same date 23, consequently, though 1911 opened inauspiciously, the hopes of better things which accompanied the continuous higher temperatures from their commencement on 17th April were completely realised by the time the annual inrush had spent its force.

LIST OF ARRIVALS OF SUMMER-BIRDS IN THE ORDER OF THEIR APPEARANCE IN 1911.

LESSER BLACK-BACKED GULL (*Larus fuscus*), Glasgow Harbour, 21st March (2) (R. W. Wilson); Possil Marsh, 2nd April (2) (W. Rennie); 4th, Dalmuir, quite common (Rennie).

WHEATEAR (*Saxicola oenanthe*), Dunure (Ayr), 23rd March (J. M'Crindle); Possil and Cadder, 26th (Rennie); Dunure, 27th, quite a large number (M'Crindle); in the Upper Ward of Lanarkshire at Carmichael, 5th April (Rev. J. D. W. Gibson); and Kinnelhead, Beattock (in Annandale), 6th (J. Bartholomew).

WHITE WAGTAIL (*Motacilla alba*), Beith, 2nd April, 1 ♂ 2 ♀ (J. Craig); Clyde, east of Glasgow, 9th (6) (J. Paterson); same date, Kelvin (1) (Rennie), and Thornliebank (1) (J. Robertson); New Cumnock, 15th (Nithsdale) (3) (T. W. Wilson); 17th, Loch Long Torpedo Factory (1) (Paterson and A. Ross); Clyde, east of Glasgow, 19th (3) (Ross).

SWALLOW (*Hirundo rustica*), Possil Marsh, 7th April (3) (Rennie); Dalmuir, 14th (1) (Rennie); in nine other localities between 17th and 22nd, pointing to pretty general distribution by latter date, but according to all reports, in very limited numbers except at Kilbirnie on 22nd, usually one, two, or three birds only, and this state of matters continued until May was fairly in.

HOUSE-MARTIN (*Chelidon urbica*), near Allander Toll, 8th April (1) (Robert Henderson, Jr.); on the Endrick, 19th (W. L. Chadwick); Dalry, 22nd (A. Shanks); Fisherton, Dunure, 25th (M^cCrindle).

CHIFFCHAFF (*Phylloscopus rufus*), Brisbane Glen, Largs, 8th April (2) (A. Purdom); Rouken Glen, 25th (1) (Galloway); Garrion, Lanarkshire, a region in which the species has been little observed, 29th (1) (Rennie).

WILLOW-WREN (*P. trochilus*), Houston, 12th April (1) (P. Thornton MacKeith); Frankfield, 19th (1) (T. W. Wilson); Giffnock, 23rd, two single birds (J. Robertson); Beith, 25th (2) (Craig); Rouken Glen, 26th, nine or ten in song, first report of their being common (Paterson and Robertson). This species usually comes in large numbers, but its abundance seems to have struck experienced observers more than usual this year. Quite a number of observers have quite independently remarked upon the fact, just as they did upon the scarcity of the Swallow. Many would pass on, and this accounts for the Chaffinch appearing to reassert itself by the middle of May in one locality, while the Sedge-warbler took the Willow-wren's place in another.

COMMON SANDPIPER (*Totanus hypoleucus*), Dalmuir (Rennie), Possil (Rennie), and Clyde at Carmyle (2) (Paterson), all on 18th April; Beith (Craig), Possil (Rennie), Endrick, "never saw it more abundant" (Chadwick), Clyde at

Carmyle (9) (Ross), and (1) above Rotten Calder (Ross), all on 19th; Loch Libo, 20th (T. W. Wilson). Several other reports refer to the 22nd and 23rd. There can be no doubt about this species appearing in large numbers within a couple of days of its first appearance, forming another contrast to the case of the Swallow.

SAND MARTIN (*Cotile riparia*), on the Endrick, 19th April (Chadwick); Kilbirnie Loch, 22nd, two (J. Craig).

COMMON TERN (*Sterna fluviatilis*), on 19th April, with a gale blowing from the south, a party of a dozen terns, which, I supposed, from the place of their occurrence and their appearance, to be of this species, passed over Cadder Wilderness from the direction of the Kelvin, flying right in the teeth of the wind.

BLACK TERN (*Hydrochelidon nigra*), one observed at Foxbar, near Paisley, on 21st April, and recorded in *The Field* (see page 96).

YELLOW WAGTAIL (*Motacillariai*), Possil, 20th April (1) (Rennie); Beith, 22nd, (Craig) and Yoker (Purdom); Canal at Cadder, 23rd (♂ and ♀) (Rennie).

CUCKOO (*Cuculus canorus*), Hindog Glen, Dalry, 22nd April (Paterson and Ross); Fisherton, Dunure, 24th (M'Crindle); Beith, 25th (Craig); Kilmacolm, 27th (MacKeith); Carluke, 29th, one, followed by a Meadow-Pipit (Rennie).

WHINCHAT (*Pratincola rubetra*), Kilmacolm, 23rd April, a pair (MacKeith); Carluke, 29th, a pair (Rennie); Possil, 30th, a pair (Rennie); Beith, 6th May (Craig).

TREE-PIPIT (*Anthus trivialis*), Kilmacolm, 23rd April (3) (MacKeith); Drumchapel, 28th (Purdom); Cadder Wilderness, 30th, at least half a dozen.

CORNCRAKE (*Crex pratensis*), Beith, 25th April (1) (Craig); Kilmacolm, 26th (MacKeith); Clarkston, Busby, 27th (H. W. Wilson, &c.); Possil, 28th (Rennie); Old Kilpatrick, 29th (Purdom).

SWIFT (*Cypselus apus*), Shawlands, Glasgow, 26th April (1) (T. W. Wilson); Beith, 2nd May (1) (Craig); Lanark, 6th (1) (Paterson); Kilmacolin, 10th (MacKeith); Possil, 14th (4) (Rennie).

SEDGE-WARBLER (*Acrocephalus phragmitis*), Possil, 26th, 27th, and 28th April, one daily (Rennie); same locality, 7th May, two (Rennie), and on this date two at Killearn (W. R. Baxter); Possil, 10th (4) (Rennie), and Beith (Craig), same date; Possil, 12th (about 8) (Rennie); Possil, 14th, all over, Willow-wren scarcely heard, Sedge-warbler doing all the singing (Rennie).

GARDEN WARBLER (*Sylvia hortensis*), Loch Trool, 30th April (R. S. and H. W. Wilson). This is in "Solway," and seems an early date for the species. For several days, a week and ten days later, Mr. John Robertson and the writer were watching daily for its appearance at the Rouken Glen without success. It is first reported in "Clyde" by Mr. Craig at Beith, 13th May, and on same date I heard it at Craignethan (Lanark). Mr. Robertson heard it in East Renfrew in several localities next day.

REDSTART (*Ruticilla phæniceus*), Rouken Glen, 4th May (1) (♀) (Paterson); Inchmoan, 7th May (R. S. & H. W. Wilson).

COMMON WHITETHROAT (*Sylvia cinerea*), Yoker, 5th May (Purdom); Inchmoan, 7th (3) (Wilsons), and Killearn, same date, several (Baxter); likely places in East Renfrew were searched on this date and on 9th, but there was no appearance of this species; Beith, 10th May (Craig).

SPOTTED FLYCATCHER (*Muscicapa grisola*), Cleghorn, 6th May (Ross); Beith, 14th (Craig).

WOOD-WREN (*Phylloscopus sibilatrix*), Giffnock, 11th May (Wilsons); Beith, 13th May (Craig).

I cordially thank all those who have helped me to prepare this report.

Notes.

Cassida nobilis. L., a beetle new to Scotland, in **Dumbartonshire**.—When staying at Ardpeaton, Loch Long, last June, I noticed that the larvæ of a *Cassida* were common on some patches of *Silene maritima* growing on the shore near there. No beetles, however, were to be seen on the plants, but ultimately, on the 27th of the month, five beautiful examples of *Cassida nobilis* were found among the shingle under them. I have shown a specimen to Dr. D. Sharpe, and he confirms the identification.

Fowler gives no Scottish locality for this species in his *British Coleoptera*. In England, Yorkshire is his farthest north county for it—and I have seen no subsequent record for Scotland. It is, therefore, a specially interesting addition to the list of “Clyde” beetles. Its recent detection in the Isle of Man (Tomlin, E.M.M., 1904) ought, perhaps, to be mentioned.—William Evans, Morningside Park, Edinburgh, 23rd February, 1911.

Glaucous Gull (*Larus glaucus*) and **Iceland Gull** (*L. leucopterus*) in **Ayrshire**.—A Glaucous gull was seen here early in November, 1910. During the winter of 1910-1911, five Iceland gulls were seen at Dunure. One was shot on 4th April for the Glenfield Ramblers’ collection in the museum at Kilmarnock. When with Mr. Thomas Morton, Newmilns, at Ayr, early in February, we saw one in the harbour there.—John McCrindle, Dunure, 23rd April, 1911.

Ringed Plover (*Agialitis hiaticola*) in **Lanarkshire**.—On 2nd April, 1911, when with Messrs. R. S. and H. W. Wilson, I saw three Ringed Plovers at Hogganfield Loch. No doubt this species is an occasional visitor in Lanarkshire at the periods of passage, but I do not remember any record for the county. Mr. John Robertson tells me, that on 4th June, 1910, he saw at least three at Bishop Loch.—John Paterson.

Black Tern (*Hydrochelidon nigra*), **Turtle Dove** (*Turtur communis*), and **Scaup Duck** (*Fuligula marila*) in **Renfrewshire**.—On 19th April this year, a Black Tern came on to Darrockstock Dam, Foxbar, with several Swallows, and was under my observation for several hours. I was fishing at the time. The dam is quite small (I should think a couple of acres), but I have shot eight different sorts of duck there in the last two years, the Scaup

(*Fuligula marila*) being perhaps the least common of them in this district. I sent a note of the occurrence of the Black Tern to *The Field*. Early in June this year also, my keeper shot a Turtle Dove here, that got up with some wood-pigeons. A farmer had asked him to shoot a few of the latter.—C. Stephen Bine Renshaw, Clippens, Johnstone.

Great Spotted Woodpecker (*Dendrocopus major*) in **Lanarkshire**.—Readers of this journal may remember that in April, 1902, I exhibited willows from Glenorchard, near Glasgow, bored by, it was supposed, the Great Spotted Woodpecker, and at that time I stated that willows similarly treated had been familiar to me at Cadder Wilderness, near Glasgow, for years past (Vol. II., pp. 142-3). On 17th April, 1910, I saw the bird in Cadder Wilderness, and on 19th April, 1911, I found quite fresh evidence of its presence on willows which have been long operated on, and for the first time in this vicinity on an oak near at hand. On 20th April, Mr. Alex. Ross saw the bird again in Cadder Wilderness. Mr. James Bartholomew tells me, that the gamekeeper at Glenorchard saw a bird on 16th April this year, that answers to the description of the Great Spotted Woodpecker, and that fresh borings were subsequently found on a willow near the place at which the bird was seen. Mr. William Rennie informs me that on 30th April this year, at Gillbank, on the Mauldslee Estate in Lanarkshire, Mr. W. M. Pettigrew and he found four gate-posts, two pretty much decayed, and all apparently freely bored by the Great Spotted Woodpecker, whose feet markings they were able to trace in several places.—John Paterson.

Reviews.

Photography for Bird-Lovers.—By Bentley Beetham, F.Z.S. Witherby & Co., London; 5s. net.

The absence of a really practical guide to the photography of bird life, has deterred many a nature photographer from launching forth into the higher branches of bird portraiture. It is, therefore, with feelings of pleasure that we welcome this little work from the pen of Mr. Bentley Beetham.

As an incentive to more ambitious effort, it should be welcomed by the camera user, who has hitherto been content to portray the nests and eggs of such birds as happen by

the way. The author writes on the assumption that the prospective bird photographer is able to turn out a good technical negative, so there is no overlapping of the matter common to the ordinary photographic text-book.

In the opening chapter, will be found much useful information dealing with the apparatus essential to the successful portrayal of bird-life, in its various aspects. The relative merits of the stand camera, as against the modern Reflex, is discussed, and some valuable hints are given regarding the discharge of the shutter release. Nest photography is treated in an exhaustive manner, but very little transpires that has not already appeared under this well-worn title.

The important matter of concealment is adequately dealt with, and the employment of natural and artificial aids is discussed under the following heads:—Natural Hides, a Hide of Branches, of Rock, of Turf, the Hiding Tent and its construction, concealing the Tent, &c., &c. Other chapters treat of the Photography of Young Birds, Stalking Methods, Rope-work, the Photography of Birds in Flight, Colour Work and Cinematography, and Photographing Birds in Captivity. The illustrations are many, and for the most part good. The picture of an Oystercatcher's nest, with a bit of rocky coast behind, is suggestive of much that might be done on similar lines.

The present popular interest in Ornithology is due in no small degree to the art of the camera, and to those who would know how the work is done, this volume is to be commended.

H. W. W.

How to Attract and Protect Wild Birds.—By Martin Hiesemann, translated. 2nd edition. Witherby & Co., London; 1s. 6d. net.

The desire to protect and encourage birds becomes happily more widespread every day, so it is not surprising to see this practical treatise reappearing, revised and brought up to date, in a second edition, fully illustrated. Those who wish to know how to realise their aspirations, in the way of protection and encouragement, can learn in these pages how it has been done. The book has reached three editions in two years in Germany, and the German Minister of Agriculture has adopted the scheme laid down in this book, with the greatest success.

Proceedings of the Society.

THE first meeting of the sixtieth session took place in the Society's Rooms, 207 Bath Street, on 4th October, 1910, Mr. John Paterson, President, in the chair.

Before constituting the meeting, the President referred to the great loss the Society had sustained since its last meeting in the deaths of several of its members, including Messrs. David Bruce, William Leighton, Alex. S. MacLean, D. R. Somerville, and Mrs. David Robertson, who were all well known for the active interest they took in the welfare of the Society, and for their hearty co-operation at its meetings and in field-work.

Messrs. Alex. Inkson M'Connachie, 1243 Argyle Street, A. T. Craig, 181 West George Street, and W. P. R. Parker, 17 Millbrae Crescent, Langside, were elected as ordinary members.

Reports on excursions to Glen Water (Mr. A. Gilchrist) and to Garelochhead and Brodick Castle Woods (both by Mr. W. R. Baxter) were read.

Mr. James J. F. X. King, F.E.S., showed specimens of the Mole Cricket (*Gryllotalpa gryllotalpa* L.) taken at Jamestown (Dumbarton) and in the New Forest. He also exhibited specimens of *Ornithomyia avicularia*, L., from Aviemore and Nethy Bridge, for comparison with *O. lagopodis* (Sharpe), taken on the hills near Dingwall, and *Liptotena cervi*, L., from Brodick Castle, where it is fairly common in the deer park.

Mr. Peter Ewing, F.L.S. showed a number of plants, several of which were new records from the districts in which they were collected. These were—*Draba incana*, L., var. *confusa* (Ehrh.), from Beinn Heasgarnich; *Erophila verna* (L.) Meyer, from Islay, by Dr. Gilmour, a new record; *Sedum villosum*, L., from Britannia Flow, Lanark, new to the county, though it was pointed out, in the course of the discussion upon the exhibit, that, at the Society's excursion in June last, it was found, not at all uncommon, on the road between Auchenheath Station and Stonebyres; *Scandix Pecten-Veneris*, L., from thatched roof, Stornoway, a new record; *Levisticum officinale*, Koch, from Stromness; *Primula scotica*, from Wick; *Veronica hederifolia*, L., from Skye, a new record; *Utricularia intermedia*, Hayne, which, in Buchanan White's *Flora of Perthshire*, is said to ascend to 1,800 feet in Breadalbane, was taken from the marsh between Ben Lawers and Meall Garbh at an altitude of 3,200 feet. As

this plant never flowered, Mr. Ewing did not before record it for this altitude, and for the same reason he has not hitherto recorded *Callitriche hamulata*, Kutz., which grows in a pool above the marsh at least 500 feet above the height recorded for it to attain in the above-mentioned *Flora*; *Plantago Coronopus*, L., var. *maritima*, G. & G., from Peterhead; *Juncus tenuis*, Willd., gathered near Killin. In Hooker's *Students' Flora* (1878), this plant was mentioned as one of Don's reputed discoveries, and now this is the 24th British county or vice-county in which it has been found; *Carex Halleri*, Gunn (*alpina*, Sw.), one of our rare British Carices from Beinn Heasgarnich.

Mr. George Lunam read a paper on "Some Additions to the Fresh-water Algae of the Clyde Area" (pp. 25-27), and Mr. John Robertson one on "Night Notes of some Birds" (pp. 22-25).

The Fifty-ninth Annual General Meeting of the Society took place on 25th October, 1910, Mr. John Paterson, President, in the Chair. The Honorary Secretary (Mr. A. Ross) read the report of the Council on the work of the Society during the preceding year, which showed, *inter alia*, that the membership was 242, made up as follows—honorary members, 16; corresponding, 34; life, 18; annual, 174. In addition to this, there are 8 associates. Since the preceding Annual Meeting, 1 honorary and 17 ordinary members had been added, and one ordinary member had become a life-member. The obituary for the year included 7 ordinary members and 1 honorary member. Considering the fare provided, the attendances at the meetings, while not less than in recent years, are still considered not satisfactory. Thirteen excursions were carried out during the year, the attendances showing an improvement upon recent years, and it was to be observed that, even when the attendance was least, valuable results were obtained.

Mr. John Renwick, Honorary Treasurer, submitted his annual abstract statement of accounts for the past session, duly audited, which was approved (page 104).

Mr. Jas. Mitchell, Honorary Librarian, reported that the books in the Library were being rearranged in view of the increased accommodation in the shape of cases now in the lecture room. The number of books and journals issued to members during the past year showed an increase upon recent years.

Mr. D. A. Boyd, Honorary Editor, reported that the Title and Index to Vol. VI. of the Society's *Transactions* (new series) only awaited final revision (since issued). Volume VIII., Part 2, with Index, &c., he hoped would be ready shortly (since issued).

The election of office-bearers resulted in Mr. W. R. Baxter being appointed a vice-president, and Messrs. A. A. Dalglish, F.E.S., George Lunam, A. B. Motherwell, and Robert S. Wilson, members of council.

Messrs. James Jack and Joseph Somerville were reappointed as auditors.

Reports of two fungus-forays to Tullichewan and Cadzow Forest, carried out jointly with the Andersonian Naturalists' Society, prepared by Mr. R. B. Johnstone, were read.

Mr. Anderson Fergusson exhibited *Galerucella fergussoni*, Fowler (see page 36).

Mr. D. A. Boyd exhibited *Cronartium ribicolum*, Deitr., from Perthshire. This fungus he found locally abundant on leaves of black currant in gardens at Crieff and Killin. The genus *Cronartium* does not appear to be represented within the Clyde area, or at least has not yet been reported for this district. *Cronartium* is a genus of the Uredineæ or rust-fungi, and is one of those which exhibit heterœcism or alternation of generations. The æcidium stage (known as *Peridermium strobi*, Kleb.) occurs on living bark of Weymouth pine (*Pinus Strobus*), and has also occurred on *Pinus Lambertiana* and *P. Cembra*. The æcidia which burst through the bark, are comparatively large in size and pale yellow in colour, and contain minutely warted orange spores. These, when transferred to living leaves of *Ribes nigrum*, germinate and give rise to pustules of uredospores. Afterwards, from the centre of each uredo pustule a small horn-like body, about one line long, springs up. This is composed of a mass of teliospores which germinate without falling away. Each teliospore gives rise to one germ tube which bears near its tip several minute secondary spores. These last, when transferred to the pine bark, give rise the first year to spermogonia, and the second year to æcidia. It may be noted that this fungus appears to be absent from America, the home of the Weymouth pine. Mr. Boyd also exhibited *Cucurbitaria picæ*, Borthwick, a pyrenomyceete parasitic on the buds of certain coniferae, which has recently

been described by Dr. A. W. Borthwick, lecturer on Forest Botany in the University of Edinburgh, from specimens obtained in Perthshire. The specimens exhibited were gathered by Dr. Borthwick and handed to Mr. Boyd while they were examining some coniferæ at Abercairny, near Crieff, during one of the excursions of the Cryptogamic Society of Scotland in September. The black pear-shaped bodies on the affected buds are perithecium, and contain asci, each ascus containing eight brown-coloured spores of the type of *Cucurbitaria*. Mr. Boyd further exhibited *Dædalea quercina* Pers., one of the Hymenomycetes, which is common in many parts of Scotland where oak trees are abundant, but is apparently less frequent in the Clyde Area. In the *British Association Hand-book List of Clyde Fungi* (1901). Cartland Craggs is the only locality mentioned for this species. It not only occurs as a saprophyte on oak stumps, but is said to attack living oaks. The substance of the fungus is very tough and corky. The hymenium consists of thick plates which are branched and united so as to form long irregular pits. As a genus *Dædalea* is allied to *Polyporus* and *Trametes*.

Mr. P. Ewing, F.L.S., read his report as representative of the Society at the meeting of the British Association in Sheffield.

Mr. Ewing also exhibited and described a collection of casual plants from the neighbourhood of Paisley, and read a paper on them by Mr. D. Ferguson (pp. 28-30).

The President, Mr. John Paterson, read a paper by Mr. Hugh Boyd Watt on Early Tree-planting in Scotland—Historical Notes (pp. 1-21).

The third meeting of the sixtieth session was held on 29th November, 1910, Mr. John Paterson, President, in the chair.

The following gentlemen were elected as ordinary members of the Society:—Messrs. William Mure, Caldwell House, Uplawmoor; Matthew T. Buchanan, the Camp, Cadder, Bishopbriggs; J. R. Jack, M.I.N.A., Mavisbank, Dumbarton; R. T. Templeton, Drumgarve, Helensburgh.

Dr. Thos. Beath Henderson exhibited a blue-headed snake (*Leptognathus Catesbyi* (Sentyen)); a European tree-frog (*Hyla arborea*, L.) and the Edible Frog (*Rana esculenta*).

Mr. Jas. J. F. X. King, F.E.S. exhibited specimens of comparatively rare moths including—*Cicadetta montana*, Scop., and nymph skin from the New Forest, and *Abraxas grossulariata*, L., var. *varleyata*, from Huddersfield.

Mr. A. Adie Dalglish, F.E.S., exhibited *Brenthis (Argynnis) selene*, Schiff., aberration *transversa*, Tutt., which was taken in Glen Cloy, Arran, on the 2nd of July this year. Mr. J. W. Tutt, in his book on *British Butterflies* (1896), mentions a banded form of *selene* which he has named aberration *transversa*; but, as he gave practically no description, a sketch was sent to him of the specimen to see if it was referable to that form. He states that it is an exceptionally fine example of that aberration. He, however, can give no data regarding his type, nor of its distribution, but it is certainly an extremely scarce form. The whole of the area between the transverse series of spots nearest to the base, and the similar series of spots beyond the branching of the nervures, is filled in with black, with the exception of the large sub-costal spot lying between, which is outlined in fulvous. There is also a heavy darkening at the base of the posterior wings. On the underside there is a slight darkening of the scales, directly beneath the band above: otherwise the markings are normal.

Mr. Dalglish also showed a very fine aberration of the underside of *selene*. It was taken at Arrochar in May, 1895. There is a dark suffusion of colour around the first two round sub-marginal spots at the apex of the anterior wings, which suffusion is also repeated around the first three spots and last two on the posterior wings. Types of the upper and under sides of the species for comparison were exhibited.

Mr. Peter Ewing, F.L.S. exhibited *Juncus tenuis*, Willd., from Ayrshire, this being the fifteenth Scottish county or vice-county in which the plant has now been found. Mr. Ewing also exhibited *Calluna vulgaris*, Salisb., var. *incana*, Reichb., from Nairnshire, and *Veronica officinalis*, L. var., *hirsuta* (Hopk.), Ewing. Mr. Ewing pointed out that no one seems to have seen this plant unless Mr. Smith, nurseryman, near Ayr, who found it, and Hopkirk, who described it, until he picked it up near Nairn. It seemed to Mr. Ewing a curious coincidence that he should exhibit at the same time the last-named two plants upon whose existence so much doubt has been cast. Messrs. William Pettigrew and George Herriot exhibited a series of colour-slides of plants and scenery which marked a great advance on previous attempts in this direction. Prof. David Ellis, D.Sc., Ph.D., F.R.S.E., read a paper entitled "A preliminary Investigation of *Cladothrix dichotoma* (Cohn)" (pp. 59-70).

ABSTRACT STATEMENT OF ACCOUNTS—SESSION 1909-1910.

1909.—Sept. 1.		1910.—Aug. 31.
To Balance—Life Members' Fund—		
Debitures, - £35 0 0		
In Bank, - 122 10 0		
		£157 10 0
Ordinary Fund—		
In Bank, - - - 108 4 3		£265 14 3
1910.—Aug. 31.		
To 1 Life Member's Subscription, - - - - -		5 5 0
" 144 Ordinary Members' Subscriptions, @ 7s. 6d., - - - - -		54 0 0
" 12 Members' Arrears, - - - - -		5 5 0
" 5 Associates' Subscriptions, @ 5s., - - - - -		1 5 0
" Interest, - - - - -		6 10 7
" Transactions and Glasgow Naturalist sold, - - - - -		2 1 10
" Fauna and Flora of Clyde sold, - - - - -		11 1 0
		£351 2 8
From the Balance of £88 4s. 7d. is to be deducted cost of Transactions for three Sessions.		
		£351 2 8
By Rent, - - - - -		£9 15 0
" Postage, Stationery, &c., - - - - -		16 16 0
" Printing Circulars and List of Members, - - - - -		12 13 2
" Printing The Glasgow Naturalist, - - - - -		44 16 4
" Carriage on The Glasgow Naturalist and Transactions, - - - - -		2 7 7
" Lantern Expenses, - - - - -		0 8 6
" Library—New Books and Magazines, - - - - -		£7 3 3
Insurance, - - - - -		0 12 0
Binding, - - - - -		3 12 0
Postage, Stationery, &c., - - - - -		0 12 8
Box and Fittings for Cases, - - - - -		1 6 7
		13 6 6
" Balance—Life Members' Fund in Bank, - - - - -		£162 15 0
" Balance, Ordinary Fund, in Bank and on hand, - - - - -		88 4 7
		250 19 7
		£351 2 8

From the Balance of £88 4s. 7d. is to be deducted cost of Transactions for three Sessions.

GLASGOW, 18th October, 1910.—We have examined the Accounts, and compared same with relative Vouchers and Securities, and found them correct. Cash due by Treasurer, Four pounds nine shillings and seven pence.

(Signed) JAMES JACK, } Auditors.
JOSEPH SOMMERVILLE, }

The Glasgow Naturalist

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OF GLASGOW

(Including the *Transactions and Proceedings* of the Society, Third Series).

Vol. III., No. 4.]

[October, 1911.]

Notes on the Ash Trees (*Fraxinus excelsior*, L.) of the Clyde Drainage Area.

BY JOHN RENWICK.

[Read 27th June, 1911.]

SEVERAL large Ash trees have been recorded from this district. The Rev. John Walker, Professor of Natural History in the University of Edinburgh, in his *Essays*, published 1812, mentions four. He says :—"Near the house of Bonhill, in Dumbartonshire, there is a very ancient and remarkable Ash, the property of Colonel Smollett of the Guards, who lived a short but most meritorious life, and lately died a most honourable death. Being a sort of family tree of the Smolletts, it has formerly been surrounded with a sloping bank of earth, about three feet of perpendicular height, designed for its preservation, and which to a great degree has answered the purpose. In September, 1784, a little above the top of the bank, or about four feet above the natural surface, this remarkable tree measured 34 feet 1 inch. At the height of 4 feet above this bank it measured 21 feet 3 inches. And at the height of 12 feet from the ground, immediately under the three great arms into which it divides, 22 feet 9 inches. At the junction of these arms the leading trunk had, above a century ago, been broken over, in consequence of which the tree had become hollowed. One of these arms measured 10 feet 4 inches, another 11 feet, and the third 12 feet in girth; and yet they seem not to have been original branches, but only pollards formed after the trunk was

broken over. Many years ago, the tree being hollowed and open on one side, the opening was formed into a door, and the rotten part of the tree scooped out. In this way a small room was formed within the trunk, of the following dimensions:—it is 9 feet 1 inch in diameter; its roof is conical, and 11 feet high; it is floored and surrounded with a hexagonal bench, on which eighteen people can sit, with a table in the middle; and above the door there are five small leaden windows. Though the tree has decayed in the heart, it continues to live in the bark and to form a great deal of new wood. The whole trunk, which is a vast mass, is thickly covered with fresh, vigorous branches, and by this sort of renovation, may continue to live, nobody can say how long.”

Mr. R. Hutchison, in the *Highland and Agricultural Society's Trans.*, 1880, states that “a remnant of this remarkable tree still exists. There is remaining a shell, about 12 feet high and 3 feet broad, of one side of its trunk, covered with healthy bark and young twigs. This relic is surrounded by an iron railing for its protection. The bark is still well covered with small branches; and about 18 inches from the ground, a pretty large branch has sprung up, which may, in future centuries, be a rival to its sire. Judging from the dimensions given by Dr. Walker, this Ash may fairly be allowed to divide the honour of being the largest of its day, in Scotland, with the Kilmalie tree.” The Ash at Kilmalie Churchyard, was, according to Dr. Walker, long regarded as the most remarkable tree in the Highlands, and held in reverence by Lochiel and his kindred and clan for many generations. It was burnt by the soldiery in 1746, but in 1764 the circuit could be traced, 58 feet.

The remnant of the Bonhill house tree has now shrunk to a shell about 18 inches high—but not continuous—out of which, spring two small stems about 6 feet apart. The larger girths 1 foot 10 inches at 4 feet up, and rises to a height of 30 feet. It does not give much promise of rivalling its parent, and the smaller one is much twisted and very sickly looking. I have been informed that one or more of the house of Smollett were married in the room formed in the tree, and that a school used to be held in it, attended by twenty-four children.

The Colonel Smollett mentioned by Dr. Walker was Lieutenant-

Colonel Alexander Smollett, who, according to Irving, *Book of Dumbartonshire*, II., page 205, succeeded to the estates [in 1799], but was killed in the same year at the battle of Alkmaer in Holland. It is from him that the village of Alexandria takes its name. The village of Renton was named after his mother, Cecilia Renton. He was a nephew of the novelist Tobias Smollett.

Dr. Walker evidently visited Cameron in September, 1784, as he records a Scots fir there which measured 7 feet 2 inches at 4 feet. I have not been at Cameron, but the late James Lumsden, Esq., of Arden, told me that this tree no longer existed. From the dates given it would seem as if Dr. Walker had written his remarks about the Bonhill tree shortly after 1799.

Dr. Walker (*Essays*, page 13) records another large Ash from the same parish. "An Ash, in the churchyard of Bonhill, Dumbartonshire, in September, 1784, measured 17 feet 9 inches [at 4 feet up], but at the height of 1 foot above ground it was found to be no less than 33 feet in girth. The trunk divides into three great arms at the height of 6 feet. It has a vast spreading head, but is not above 50 feet high. This tree was measured by Mr. Beever in 1768 (*Bath Memoirs*, 1780, Vol. I., page 77), who found it to be 16 feet 9 inches in circumference at the height of 5 feet. Though certainly of great age, it is as fresh and vigorous as an Ash 20 years old."

Mr. Hutchison, in the *Highland and Agricultural Society's Trans.*, 1880, states—"This tree perished in a gale on 1st November, 1845. Its circumference at 3 feet from the root was 26 feet 6 inches, and at its bifurcation $22\frac{1}{2}$ feet. Its north branch was 13 feet, and its south branch $12\frac{1}{2}$ feet in girth. The circle round the base was 62 feet, and its height considerably over 100 feet, the spread of its branches 100 feet in diameter. A lithograph of the tree hangs in the session-house of the parish church, and two chairs made from the wood of the tree stand in the vestibule of the church."

In his tour in September, 1784, Dr. Walker visited Inchmurrin, and measured three Ash trees, two of them near the north end of the island, of which one girthed 28 feet 5 inches and the other 20 feet 8 inches at 4 feet up. "These two trees have been broken over, about 7 or 8 feet above ground, much above half-a-century ago; as there is a group of large boughs growing from

the top of their old trunks, as from a pollard. Both trees are hollowed and each forms a great bulk of living and dead timber, strangely mixed and interwoven by a succession of growths." (*Essays*). Mr. Hutchison (*loc. cit.*) states that "one of these trees still exists, and is rather a curious relic. It is quite hollow, and appears to have, at sometime, been broken over about 7 feet from the ground. Just below the break numerous shoots have, however, formed all round the trunk, and are now from 10 to 18 inches in diameter, and have established a connection with the old roots of the stump, which appear still vigorous. A zone of fresh wood and bark has been thus formed over the old hollow trunk, which now measures 25 feet in circumference. The thickness of this hollow shell is from 6 to 16 inches, and the whole forms a sort of roofless chamber, in which from four to six adults may stand without inconvenience." The third Ash was "in the old castle which was anciently the residence of the Earls of Lennox. It grows in what was the hall of this castle on the top of a vault. It is nearly 50 feet high, and on 22nd September, 1784, measured 8 feet 8 inches at 4 feet. This tree shows to what a large size the Ash will arrive in a hard, dry, and stony situation." Mr. A. Crosbie, gardener, Buchanan Castle, informs me that the only old Ash tree now remaining in Inchmurrin has a trunk 22 feet in circumference, 12 feet high, dividing into four limbs each about 3 feet in girth. The tree is quite vigorous, although there is a hole nearly through the trunk.

In the neighbourhood of Loch Lomond there was another large Ash tree, once the Bell-tree in Drymen Churchyard. The *Agricultural Report of Stirlingshire*, published 1812, gives the girth as 13 feet 8 inches at middle of trunk, and 15 feet at 1 foot. The (new) *Statistical Account*, written 1838, revised 1841, says "It now measures 16 feet 7 at 1 foot, and 16 feet 1 inch at middle of stem about 5 feet from the ground. It has weathered at least 200 years." In the *Highland and Agricultural Society's Trans.*, March, 1864, the tree is stated to be decaying at the top, the girth in 1858 having been 17 feet 1 inch, possibly at 5 feet; height, 65 feet; diameter of shade, 70 feet. When I saw it in May, 1889, its girth was 17 feet 4½ inches at 5 feet, and 17 feet 5½ inches at 1 foot. It was then very much decayed, and was blown down on 23rd September, 1892.

Mr. James Kay, forester on the Bute Estate, records in the *Highland and Agricultural Society's Trans.*, vol. IX., two Ash trees at Eden Place, Rothesay, appropriately named "Adam" and "Eve." "Adam" girthed 17 feet 5 inches at 5 feet, in 1872, but was removed in May, 1878. "Eve" girthed 12 feet 3 inches at 5 feet in 1878, with a height of 66 feet. When I saw it a number of years later there was a paling round it, preventing a measurement being taken. It was removed in June, 1904. In the *Highland and Agricultural Society's Trans.*, 1864, three large trees are recorded —(1) one near Auchinleck House, Ayr, 17 feet 2 inches at 2 feet, height 75 feet; (2) Catrine farm, 18 feet 9 inches, no datum line given, height 100 feet; (3) Dalserf estate, 18 feet 3 inches at bottom, decaying. The last is mentioned in the (new) *Statistical Account*, April, 1840. "In the lawn in front of Dalserf House there is an Ash tree of great size and girth, perhaps one of the finest in Scotland, and which generally attracts the notice of strangers." Mr. Richard M. Kay and I visited the place in 1899, and were informed that it had been blown down about 20 years previously.

In the (new) *Statistical Account*, it is stated that "in the churchyard at Mauchline in the centre of the town, there is an Ash 15 feet in circumference, containing upwards of 300 solid feet. On its top a colony of rooks have fixed their residence. The age of this tree is unknown."

A recently published description of the town and district of Mauchline, by J. Taylor Gibb, gives a picture of the old church, said to have been built about the twelfth century, and states "the tree seen in the picture of the Auld Kirk, is what was locally called the Kirk-end tree. It may have been from one of the boughs of this tree the bell of 'Holy Fair' was suspended, for we learn that about this time the wooden belfry on the east gable of the kirk, had become so unsafe that the bell was in danger of falling at ringing. It was an Ash of huge size, measuring 15 or 16 feet in girth 6 feet above the ground. It fell in 1860 in a gale and yielded more than 200 feet of timber, the most of which was turned to good account, snuff-boxes, needle cases, and kindred articles being made of it; and, if we mistake not, the Ark of Lodge St. Mungo, Mauchline (now dormant) is of the same wood."

In the table accompanying this paper, measurements of 45 Ash trees are given in the area draining into the Clyde—12 in Ayr, 14 in Dumbarton, 7 in Lanark, 6 in Renfrew, 3 in Argyll, 2 in that part of Stirling and 1 in that of Perth which fall under this definition.

Of these, 10 are above 15 feet in girth,
10 between 13 feet and 15 feet,
15 between 11 feet and 13 feet,
11 under 11 feet.

The tree with the greatest girth (23 feet 9 inches) is at Killermont, but this is at the ground. The tree divides into 9 trunks at 1 foot up, and looks more like a group than a single tree. It has a height of 64 feet. *

The next is the Bell-tree at Drymen, already mentioned, 17 feet 4½ inches at 5 feet, which is no longer in existence. Therefore, taking girth, height, and bole into account, the largest Ash in our district is probably the one at the Temperance Hotel, Arrochar, in Dumbartonshire. It is situated on a steep slope. At 4 feet up on the high side, or 8½ feet on low side, it girths 16 feet 6 inches and has a bole of 16 feet and a height of 80 feet.

At Mambeg on the Gareloch, also in Dumbartonshire, there is a fine large tree, 16 feet 2½ inches at 4 feet 9 inches, bole 9 feet. Close to it, till a few years ago, was another Ash, nearly as large. There are several large Ash trees at Rosneath.

The largest Ash tree in Ayrshire, so far as known to the Rev. Dr. Landsborough or us, is situated at Craigie Castle, near Kilmarnock. In a letter to the late Mr. Alex. Somerville (December, 1902) the Rev. Dr. Landsborough wrote:—"I discovered recently the oldest, at least greatest in girth, of the Ash trees of Ayrshire, one seventeen feet in girth five feet up. I got it at a very interesting spot, within the range of the fallen ruins of the old Craigie Castle." In July, 1904, the doctor took us to the castle. Two large masses of the ruins, each about nine feet

*Apparently it somewhat resembles one which Mr. Elwes records in *Trees of Great Britain and Ireland*, page 876. "On the shore of Loch Fyne, a mile north of Minard Castle a curious Ash grows on the beach at high water mark, which is known as the 'Nine Sisters,' because 9 stems sprang from the same root, the largest of which, when I saw them in 1907, were 7 to 9 feet in girth."

high, lie against the tree on opposite sides. A satisfactory measurement of the girth can only be got at 6 feet, where it measures 16 feet $1\frac{1}{2}$ inches. Its height is 60 feet, and the spread 70 feet. The trunk is hollow, and divides into three stems at 7 feet up.

Craigie Castle, according to Paterson, *Hist. Ayrshire*, II., 335, was probably either wholly or partially erected toward the close of the fourteenth century, subsequently to the marriage of Wallace of Riccarton with the heiress of Craigie [a Lyndesay] in 1371.

Another large Ash tree in Ayrshire is situated at Hunterston, and was known as the resting tree, from its having been the resting place in old coaching days. An illustration of it, with Dr. Landsborough in the foreground, is given in our *Transactions*, Vol. VI. (N. S.), Plate III. (page 382). The girth at 4 feet is by mistake stated as 14 feet $8\frac{3}{4}$ inches in 1902, instead of 15 feet $8\frac{3}{4}$ inches, height 60 feet, bole 8 feet. When Mr. Paxton photographed it in 1892, he took the girth at 5 feet up, it measured 16 feet 1 inch, but the trunk at this point has begun to swell out to give off a large branch. In "Notes on a Book of Photographs and Measurements of Remarkable Ayrshire Trees, presented by Mr. George Paxton to the Library of the Royal Botanic Garden, Edinburgh," Dr. D. Christison (*Trans. Bot. Soc., Edin.*, Vol. XX., page 386) writes, "The handsome Hunterston Ash, 16 feet 1 inch in girth 5 feet up, gives promise, indeed, of climbing in no long time into the foremost rank [of forest species]; and an Ash at Lanfine, 15 feet 10 inches in girth at 5 feet, in 1879 (Landsborough), ought by this time to have surpassed the Hunterston tree."

When I was at Lanfine I did not see this tree, and I am afraid it has gone.

There is a large Ash at Perceton House, 15 feet $6\frac{1}{2}$ inches in girth in 1909, bole 12 feet. This is a very handsome and beautiful tree.

We have taken the heights of 25 of the 45 Ash trees in attached table. The tallest is one in the glen of the Nethan, 98 feet high, with a girth of 14 feet 9 inches at 7 feet, bole 12 feet. Seven of them come between 80 and 88 feet, four between 70 and 76 feet, and eleven between 60 and 65 feet. A fine one at

Garrison Tower is 88 feet, with a long bole of 48 feet, and a girth of 14 feet $8\frac{1}{2}$ inches. Another, 88 feet high, is at Duntreath Castle, girth 10 feet $2\frac{1}{4}$ inches, bole 22 feet. One at Tullichewan Castle is 85 feet high, girth 11 feet $9\frac{1}{2}$ inches; one at Blair House, Dalry, 84 feet, girth 12 feet $2\frac{1}{2}$ inches, bole 16 feet.

Mr. Kay records one in the Beech Walk, in Mountstuart, 134 feet high in 1878, bole $35\frac{1}{2}$ feet, girth 9 feet 4 inches at 5 feet. In 1903 Mr. Kay informed me that this tree had been blown down. Mr. Elwes (*Trees of Great Britain and Ireland*, page 876), says "if this measurement was correct it must have been the tallest hardwood tree in Scotland."

Of park-like trees, with a large spread of foliage, we have five of 87 feet and upwards. The greatest is one on Laderishmore Farm, near Balloch, Dumbartonshire, with a diameter of $102\frac{1}{2}$ feet, a girth of 16 feet 8 inches, and a height of 65 feet. One at Newark Castle, near Ayr, stretches out to 98 feet, with a height of 80 feet, and a girth of 14 feet $4\frac{1}{2}$ inches. This would form a worthy successor to the Dule-tree, also an Ash, which used to be there. According to Paterson (*History of Ayrshire* II., page 349), it was a noble tree, measuring about 15 feet round, and beautifully proportioned.

In Cadzow is one with a spread of 97 feet, a height of 80 feet, and a girth of 14 feet $11\frac{1}{4}$ inches. In Strathleven one with a diameter of 87 feet, girth 15 feet 8 inches, and height 74 feet. In Daldowie, near Glasgow, one with a spread of 87 feet, girth 12 feet $7\frac{1}{2}$ inches. "The Laird's Tree" in Auchentorlie, Bowling, has a spread of 74 feet, a height of 64 feet, and a girth of 12 feet 3 inches.

The average yearly rate of girth-increase varies very much. On the whole it appears to be less than that of the Beech, and greater than that of the Sycamore. The highest rate, 1.24 inch, during 19 years, has been attained by the large wide-spreading tree at Laderishmore. The trunk is a short one, 9 feet, but the tree is in vigorous condition, and has an immense amount of foliage. During the first seven years (1892-1899) the rate was 1.23 inch a year, and during the last eleven years (1900-1911) the rate has been higher, 1.25 inch. Nearly equal to it is the large tree at Arrochar, 1.23 inch annually for 13 years. Next comes one at Mauldslie Castle, with a rate of 1.11 inch over 18

years, at 4 feet 6 inches up on a short bole of 7 feet, the girth being 13 feet $11\frac{1}{2}$ inches, height 76 feet. The larger tree at Mambeg shows a rate of 1·04 inch during 17 years, and the smaller ·85 inch during 11 years. From June, 1893, to June, 1904, the former increased $12\frac{1}{4}$ inches, the latter $9\frac{1}{2}$ inches, yearly average 1·09 inch and ·85 inch respectively. The latter was evidently the poorer tree, an inference borne out by the fact that, although slightly more sheltered than the other, it succumbed to a storm some time after 1904. The survivor increased $6\frac{1}{4}$ inches between June, 1904, and September, 1910, a yearly rate of ·96 inch. It is thus growing more slowly now.

The "Bell-tree" at Drymen had an increased girth of 29 inches between the size recorded in 1811 and that in 1841, and of $15\frac{1}{2}$ inches between 1841 and 1899. If we can depend on all these figures the rate for the first 30 years was ·97 inch, for the last 58 years ·27 inch, and for the 88 years ·50 inch annually.

The fine wide-spreading tree in Strathleven increased $14\frac{1}{2}$ inches in 16 years = ·90 inch per annum. An Ash on the side of Loch Riddon, cut down at 3 feet, showed 105 rings in a circumference of 6 feet $11\frac{1}{2}$ inches, equal to an annual growth of ·80 inch. An Ash in Eglinton policies in 11 years increased at the rate of ·70 inch at 3 feet up, and ·68 at 5 feet. It is now 8 feet at 3 feet, 7 feet $5\frac{1}{2}$ inches at 5 feet, height 64 feet, bole 13 feet.

Very interesting are the details of four Ash trees in Cathcart Churchyard. One was cut down between 1894 and 1896, and showed 168 to 170 rings of growth in a circumference of 11 feet 3 inches at 3 feet 6 inches from the ground, or an average of ·81 inch yearly during 166 years since the tree was $3\frac{1}{2}$ feet high. The tree in the S.W. corner, with a bole of 10 feet, has a girth of 11 feet $3\frac{1}{4}$ inches at 5 feet 1 inch, an increase of $4\frac{1}{4}$ inches between November, 1898, and 19th June, 1911, a rate of ·34 inch yearly. That to the S.E. of the church has a bole of 14 feet and a girth of 10 feet $10\frac{3}{4}$ inches, an increase of $4\frac{3}{4}$ inches in the same period.

It, however, shows the largest increase of the three, $4\frac{3}{4}$ inches = ·38 inch annually. The girth now is 10 feet $9\frac{1}{2}$ inches.

Contrasting the ·81 inch increase of the whole life of the deceased tree with the ·38 inch, ·34 inch, ·30 inch of the survivors during the last 12 years, it suggests that the smoke of

the surrounding houses and works has begun to affect their growth adversely.

Mr. Kay (*l.c.*) states that the big Ash, "Adam," at Eden Place, Rothesay, with a girth of 17 feet 5 inches, was 220 years old in 1878 = 214 years in 1872. This gives an annual girth increase of $\cdot 99$ inch over the whole life of the tree; 210 years since it was 5 feet high. He estimated the age of the tall Mountstuart one, girth 9 feet 4 inches at 5 feet, as 166 years = $\cdot 67$ inch annual growth. One at Kames (Bute), 11 feet 2 inches at 5 feet in 1878, height 72 feet, bole 20 feet, he estimated at 160 years = $\cdot 86$ inch yearly. "Eve" was calculated to be 257 years old in 1904 (James Kay, 1905). Therefore, in 1878, when it was stated to be 12 feet 3 inches in girth at 5 feet, it would be 231 years of age. Assuming that it was 227 years since it was 5 feet high, the average yearly increase was $\cdot 65$ inch, very much less than its companion.

Dr. Walker (*Essays*, p. 11) records an Ash near the house of Kames, Isle of Bute, in 1771, 80 years old, which was about 60 feet high, and measured, in September, 10 feet 10 inches at 4 feet. This would give the very high rate of 1.62 inch a year.

Since the appended table was printed, I have heard from Mr. Alex. MacLarty, forester at Tullichewan, that there are several notable Ash-trees at Buchanan Castle, Stirlingshire. I have not had an opportunity of visiting them, and they are not included in statistics given in above paper nor in appended table. The following are the measurements supplied by Mr. MacLarty :—

Date.	Girth.	Bole.	Height.
Sept., 1911,	16 ft. 6 $\frac{1}{2}$ in. at 3 ft. 6 in.	7 $\frac{1}{2}$ ft.	70 ft.
" "	11 " 5 " " 3 " 9 "	12 "	75 "
" "	11 " 7 " " 5 " 3 "	13 "	100 "

Table of Measurements of Ash Trees in Clyde Drainage Area.

By JOHN RENWICK and RICHARD M'KAY.

RENWICK.—ASH TREES OF CLYDE DRAINAGE AREA. 115

(a) Date of earliest measurement.	(b) Date of latest measurement.				(c) Average yearly rate of girth increase.							
LOCALITY.	Date (a).	Girth.	At	Date (b).	Girth.	Increase in Girth.		Bole.	Height.	Spread.	Date of Height and Spread.	
						In.	Years.					In.	Ft.
ARGYLLSHIRE.												
Ardgartan, -	-	4/1911	11 4	5 0	..	...	...	14	...	...	...
Inveraray Castle, -	6/1899	13 7	5 0	...	...	...	...	45	...	...	...
Side of Loch Riddon, -	5/1901	6 11½	3 0	cut down 105 Rings	...	83·5	105	·80	...	...	...
AYRSHIRE.												
Auchincruive, -	9/1905	12 4	5 0	...	...	...	...	30	...	...	...
Ballochmyle, -	5/1898	12 2	3 0	...	...	...	...	...	...	...	...
Blair House, -	4/1895	11 4½	{ 5 9 high side low 7 0 side }		4/1911	12 2½	10·25	16	·64	84	1911	
Goodham House, -	7/1904	13 2	5 0	...	...	...	...	16	...	...	...
Craigie Castle, -	7/1904	16 1½	6 0	...	...	...	...	7	60	*70	...
Eglinton Castle, -	3/1910	12 2	5 0	4/1911	12 2¾	·75	1	·75	18	70	1911	
Do.,	{ 4/1900		6 10	5 0	12/1910	7 5½	7·5	11	·68	{ 13	{ 64	{ 1910
	{ 4/1900		7 4½	3 0	12/1910	8 0	7·75	11	·70			

TABLE OF MEASUREMENTS OF ASH TREES IN CLYDE DRAINAGE AREA—*Continued*.
AYESHIRE—*Continued*.

LOCALITY.	Date (<i>a</i>).	Girth.		At	Date (<i>b</i>).		Girth.		Increase in Girth.		Bole.	Height.		Spread.		Date of Height and Spread.
		Ft. In.	Ft. In.		Ft. In.	Ft. In.	In.	Years.	In.	(<i>c</i>).		Ft.	Ft.	Feet.	Feet.	
Eglinton Castle, †	-	7/1905	4 4	3 6	8/1911	4 4½	50	6	50	58	50	65	65	...	...	1911
Hunterston, -	-	9/1902	15 8½	4 0	9/1905	15 10½	175	3	58	8	8	60	60	...	...	1902
Kilmarnock (at the New Mill),	Spring, 1879	11 11¾*	5 0		1/1904	12 7	725	25	29	18	18	63	63	...	...	1904
Newark Castle, -	-	9/1907	14 4½	5 3	...	...	...	...	...	12	12	80	80	98	...	...
Perceton House, -	Spring, 1879	13 8*	5 0		8/1909	15 6½	2250	309	73	12	12	...	...	...	...	...

* *Fide* Rev. Dr. Landsborough. † Var. *monophylla*.

DUMBARTONSHIRE.

Arrochar, Temperance Hotel, -	-	4/1898	15 2	$\left\{ \begin{array}{l} 4 \text{ 0a}^* \\ 8 \text{ 8l} \end{array} \right\}$		4/1911	16 6	16	13	123	12	80	80	...	...	1911
Auchentorlie House, -	-	2/1896	11 8½	4 3	5/1907	12 3	650	11	59	23	23	64	64	78	...	1907
Do., †	-	5/1907	5 5½	5 0	4/1909	5 6¾	125	2	62	9	9	45	45	54	...	1907
Edinbarnet, -	-	5/1893	11 6½	5 6	3/1901	11 10½	400	8	50	12	12	72	72	...	...	1901
Killermont, †	-	1/1899	23 5	Ground.	...	...	...	...	...	1	1	64	64	...	...	...
Laderishmore, -	-	7/1892§	14 8	$\left\{ \begin{array}{l} 2 \text{ 8h}^* \\ 5 \text{ 6l} \end{array} \right\}$		9/1911	16 8	2400	193	124	9	65	65	102½	...	1911
Mambeg, -	-	6/1893	14 8	4 9	9/1910	16 2½	1850	177	104	9	9	...	...	...	...	...

RENWICK.—ASH TREES OF CLYDE DRAINAGE AREA. 117

Do.,	-	-	6/1893	14	5½	4	6	6/1904	15	3	9.50	11.2	.85	9	...	...	...
Strathleven,	-	-	3/1895	14	5½	5	8	1/1911	15	8	14.50	16	.90	11	74	87	1911
Do.,†	-	-	3/1909	11	4	5	0	1/1911	11	4½	.50	2	.25	30	60	...	1911
Tullichevan,	-	-	12/1910	14	9	5	0	9/1911	14	10	1.00	1	1.00	8	60	...	1911
Do.,	-	-	6/1894	10	10½	5	2	10/1910	11	9½	11	16.5	.67	23	85	...	1905
Do.,	-	-	9/1911	13	2	5	0	...	...	...	...	...	...	8	...	...	...
Bonhill Place,	-	-	{ 6/1911 1 10** 4 0		...	...	...	...	...	...	...	...	...	...	30	...	...
			{ 9/1784 34 1 4 0		...	...	...	...	...	...	...	...	...	...	...	...	...

*h = high side; l = low side. Tree is on a bank.
 † *Annals Andersonian Naturalists' Soc.*, vol. I.

‡ Var. *monophylla*.
 § Decaying.

† Divides near base into nine stems.
 ** See description of this tree, page 105.

LANARKSHIRE.

Cadder (on Roman Castellum),	2/1899	14	0	2	0	3/1910	14	5½	5.5	11	.50	5	62	...	...	1899
Cadzow, -	-	10/1903	14	6	5	0	5/1911	14	11½	5.25	7	.75	13	80	97	1911
Craignethan, -	-	1/1901	14	9	7	0	...	...	...	...	...	...	12	98	...	...
Daldowie, -	-	2/1909	12	7½	5	0	...	...	...	...	...	...	20	...	87½	...
Garrison Tower, -	-	5/1900	14	7	5	0	5/1903	14	8½	1.50	3	.50	48	88	...	...
Hamilton (South Haugh),	5/1911	12	0½	5	0	...	...	...	...	...	...	...	14	...	...	...
Mauldsie Castle, -	8/1891	12	3½	4	6	3/1911	13	11½	.20	18	1.11	7	76	1899

PERTHSHIRE.

Inverarnan,	-	-	6/1900	14	10	3	3	5½
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TABLE OF MEASUREMENTS OF ASH TREES IN CLYDE DRAINAGE AREA—Continued.

RENFREWSHIRE.

LOCALITY.	Date (a).	Girth.		At	Date (b).		Girth.		Increase in Girth.		Bolt.	Height.		Date of Height and Spread.
		Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Years.	Ft.	Ft.	Feet.	Spread.
Ardgowan, -	4/1894	13	2	2	4	9/1908	13	7½	5·25	14	·38	7½	...	...
Cathcart Churchyard, -	11/1898	10	11	5	1	6/1911	11	3½	4·25	12·4	·34	10	...	...
Do., -	11/1898	10	4¾	3	4	6/1911	10	9½	4·75	12·4	·38	14	...	...
Do., -	11/1898	10	7	4	1	6/1911	10	10¾	5·75	12·4	·30	14	...	...
Do., -	3/1892	11	3	3	6	Cut down 1894.			135	170	·80	...	...	...
									170	Rings.				
Nether Pollok, -	7/1893	11	10¾	4	5	8/1904	12	3½	4·75	11·25	·42	8	...	...

STIRLINGSHIRE.

Drymen Churchyard, -	{		About 1811*		13	8	5	0	About 1841†		16	1	29	30	.97	...	...	...
			{		...	...	...	...	{		5/1899	17	4½	{ 15.5 44.5	58 88	{ .27 .50	10	...
			...															
Duntreath, -	-	-	3/1895	9	11	5	4	1/1905	10	2½	3.25	10	.32	22	88	...	1899	

* Agricultural Report of Stirlingshire quoted in † New Statistical Account, written 1838, revised 1841.



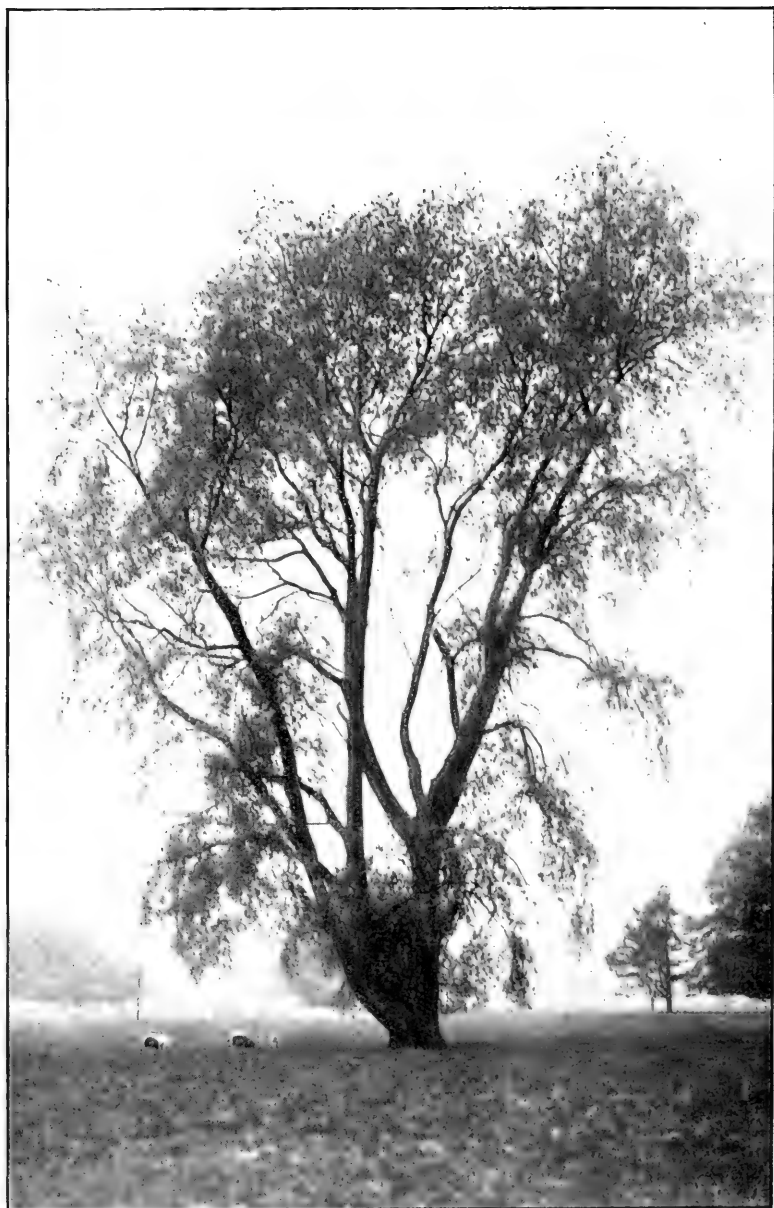


Photo. by

J. W. REECH.

GREY POPLAR (*Populus canescens*) AT MAULDSLIE CASTLE, LANARKSHIRE.

Large Grey Poplars (*Populus canescens*, Lin.) at Mauldslie Castle.

BY JOHN RENWICK.

[Read 27th June, 1911.]

PREVIOUS to the excursion on 10th June, 1911, the Society had visited the policies of Mauldslie Castle three times, namely, August, 1891; March, 1893; and May, 1903. Reports of the second and third visits appeared in our *Transactions*, Vol. IV. (N. S.), page 92, and Vol. VII. (N. S.), page 81. Among the many fine trees on the estate special notice was taken in the first report of two notable Poplars, girthing respectively 15 feet 4½ inches and 18 feet 2½ inches, and the remark was made "We have not seen any Poplars equal to these." In the second report measurements were given, namely—

May, 1899,	height	119 feet.	May, 1903,	girth	16 feet	1¾ inches.
"	"	"	103	"	"	"
"	"	"	"	"	20	1½ "

Both were described as the White Poplar (*Populus alba*, L.).

At the request of Mr. H. J. Elwes, F.R.S., and Dr. A. Henry, F.L.S., Reader in Forestry, Cambridge University, who are bringing out a book on "The Trees of Great Britain and Ireland," I had been sending them specimens and measurements of Black Poplars. In a list I included these two as White Poplars. Dr. Henry wrote (January, 1911), "These are remarkable records; I have no specimens; I dispute the name *P. alba*, and I doubt if *P. canescens* can attain such a size. We have not such a girth in any tree in England. Can I have twigs sent me now, with a few old leaves picked from the ground?" These were obtained through the kindness of Mr. James Whitton, and of Mr. D. Bryson, gardener at Mauldslie Castle. Dr. Henry replied, "They are both *Populus canescens* without any doubt. These are simply enormous trees, larger than any in England or Ireland. *P. alba* is not a native but a Continental southern tree, and we know no large ones in England. *P. canescens* is a native of South England at least."

By cordial permission granted by Lord Newlands, proprietor of Mauldslie, Mr. Whitton, Mr. N. Reid, and I visited the policies in March this year (1911). The former photographed the trees, while Mr. Bryson and I measured them. One near Ha'hill or Kenneth's Tower had a girth of 16 feet $5\frac{1}{4}$ inches at 2 feet 9 inches, bole 10 feet, height 119 feet. The other, near the front of the Castle, had a girth of 21 feet 3 inches at 2 feet, bole 3 feet, height 100 feet, diameter of spread of foliage 114 feet. I say "bole 3 feet," but above the first great branch the girth is little diminished, being 19 feet 5 inches at 5 feet 2 inches from the ground, the branch itself being 7 feet 5 inches at 3 feet 6 inches from the main stem.

In acknowledging copies of photographs of these trees, Dr. Henry wrote of them as *Populus canescens*, the Wild Grey Poplar, common in, and a native of, the south of England, and the largest known to exist in the United Kingdom, and none bigger recorded, so far as they know, on the Continent. "The White Poplar, with deeply lobed leaves, very white beneath," writes Dr. Henry, "is only a planted tree in Britain, and no very large specimens occur."

Though Lord Newlands knew them well as very large trees, he did not know that they are the premier specimens of their kind. It is pleasant to learn that the Clyde valley has produced the record examples of *Populus canescens*.

Between May, 1903, and March, 1911, the smaller (in girth) and taller tree has increased in circumference $3\frac{1}{2}$ inches = .47 inch yearly; the larger (in girth) and lower tree $13\frac{1}{2}$ inches = 1.69 inch per annum. The latter has considerably more foliage than the former. Both show decreased rates compared with previous years:—

Smaller Tree.			Larger Tree.		
Period.		Average Annually.	* Period.		Average Annually.
1893-1899, ...		.89 inch.	1891-1899, ...		2.16 inch.
1899-1903, ...		.94 "	1899-1903, ...		2.37 "
1903-1911, ...		.47 "	1903-1911, ...		1.69 "

The diameter of spread of branches in 1893 was, of the smaller tree $94\frac{1}{2}$ feet, and of the larger $102\frac{1}{4}$ feet.

A plate accompanying these notes, shows the tree with the larger girth. [Plate II.]

Proceedings of the Society.

The fourth meeting of the sixtieth session was held on 20th December, 1910. Mr. John Paterson, President, in the chair. Messrs. Alexander J. Hume, 15 Fotheringay Road, Pollokshields, James Simpson, M.A., Briar Villa, Maryhill, and John Smith, The Knowe, Pollokshields, were elected as ordinary members.

An exotic land planarian, *Bipalium kewense*, Moseley, was exhibited by Mr. Andrew Barclay, F.E.I.S. This interesting creature was first discovered in Europe at the Botanic Gardens in Giessen, and afterwards in a hothouse in Kew, in 1865. It was described in 1878 by Professor Moseley. Since the original discovery it has been found in a few gardens in England, and in Scotland in 1896, in Woodside Gardens, Paisley. The specimens shown by Mr. Barclay were taken in the Hospital Gardens, Ruchill, where the species seems to be firmly established. The specimens exhibited measured eight inches in length. Those in the gardens vary in size up to ten inches. A splendid view of the external structure of the animal and of its mode of progression were obtained by means of the lantern, a living specimen, enclosed in a Petri dish, being projected on the screen. The only observations recorded of the habits of the species, as far as Mr. Barclay knows, were made by Mr. Charles Hogg on the Paisley specimens, and these are printed in the Transactions of this Society, Vol. V. (N. S.) (pp. 53-54). Mr. Barclay hopes at a future meeting to give as complete an account as possible of the habits of the creature, which he is keeping under close observation. The species is supposed to be indigenous to Samoa, Java, and the coasts of Japan and China, and is understood to have been introduced into Europe with plants from abroad.

Mr. A. Inkson M'Connochie delivered a lecture on Deer, Deer Forests, and Deer Stalking, which was illustrated by many lantern-slides.

The fifth meeting of the sixtieth session took place on 31st January, 1911, Mr. John Paterson, President, in the chair. Miss Jessie H. Crichton, 8 Montgomery Crescent, and Mr. Wm. Calvert, 7 Lothian Gardens, Kelvinside, North, were admitted as ordinary members of the Society. Mr. W. R. Baxter exhibited

a Waxwing (*Ampelis garrulus*) which was shot on 3rd December, 1910, at the edge of a small plantation behind Helensburgh. The bird was alone, and none had been seen there since. It was evidently a young bird, and had only one of those wax-like appendages on the wings from which it gets its trivial name.

Mr. Robert S. Wilson exhibited specimens of the Mealy Redpoll (*Linota linaria*) (♂ ♀) from Beith, obtained this winter (see pp. 34-35), also a Willow Tit (*Parus atricapillus kleinschmidti*) from Giffnock, Renfrewshire, a form not hitherto known to occur in the Clyde area but to which our more or less familiar Marsh-tits may after all be all referable.

Mr. Henry M'Culloch sent for exhibition, by the courtesy of Mr. Allan Gilmour, a Pintail (*Dafila acuta*) from Eaglesham, shot in the present season.

Mr. T. Thornton M'Keith gave an interesting lantern exhibit, chiefly of birds and their nests and eggs. Many of his slides were much admired.

Mr. John Robertson read a paper on "The Birds of East Renfrewshire" (pp. 41-59).

The sixth meeting of the sixtieth session took place on 28th February, 1911, Mr. John R. Lee, Vice-President, in the chair.

Messrs. Weeks and J. G. Connell, F.R.M.S., and Dr. Thos. B. Henderson exhibited some reptilia and amphibia. These included the Natterjack Toad (*Bufo calamita* Laurenti), and Dr. Henderson stated that he could not see how he could be mistaken in a toad which he believed to be this species which came under his notice at Balquhiddy in June, 1909. So little is known of the distribution of this species in Scotland, that it is to be regretted that the Balquhiddy toad was not secured and its identity established.

Mr. J. R. Jack, M.I.N.A., exhibited by lantern a large number of micro-photographs and colour micro-photographs which excited considerable interest and admiration. Lucid explanations were given regarding the natural history of many of the objects and technical details of the processes employed by Mr. Jack.

Dr. Jas. F. Gemmill, M.A., M.D., D.Sc., contributed some Laboratory Aquarium Notes (see pp. 77-81).

The seventh meeting of the sixtieth session took place on 28th March, 1911, in the Society's Rooms as usual, Mr. John Paterson, President, in the chair.

Mr. John M'Crindle, Dunure, Ayr, was elected as an ordinary member.

Mr. John R. Lee exhibited *Tetraphis Browniana*, Grev., from Torrance Glen, East Kilbride, which he described as a very minute moss growing upon the surface of sandstone rocks in shady situations. It is composed of a small tuft of curious strap-shaped frondiform leaves in the centre of which is the bud-like perichætum from which the capsule arises. The latter is borne upon a seta about a quarter-of-an-inch in length, and is the most conspicuous part of the moss. It has a peristome of four solid triangular teeth, a character shared by the well-known beautiful little cup-moss *Tetraphis pellucida*, Hedw., and it has, on that account, been placed in the same genus, but it is extremely doubtful whether the two should not be regarded as really remote in their affinities. Some doubt, Mr. Lee said, seems to have rested hitherto as to the existing records of *T. Browniana* in Lanarkshire. Mr. Lee also exhibited *Bartramia pomiformis*, Hedw., var. *crispa*, B. and S. from Campsie Glen. This variety of the common apple-moss is somewhat intermediate in character between that species and the rarer *B. Halleriana*, Hedw. The leaves in the latter species are usually much longer and generally twisted to one side, but in microscopic structure conform to the leaves of *B. pomiformis*. The fruiting characters are, however, distinctive, the capsules being commonly produced in pairs upon short curved setæ, whereas the capsules of *B. pomiformis* are generally much exserted upon a long straight seta. In the specimen shown some of the stems had capsules of exactly the form described for *B. Halleriana*, whilst others were borne singly upon straight setæ of varying lengths. It has been suggested that plants of this intermediate form may be the result of hybridization, but the comparative rarity of undoubted plants of *B. Halleriana* seems to militate somewhat against this view.

Dr. R. Brown read a paper on the Gentians of the High Alps, and exhibited and gave a description of the species.

Mr. D. A. Boyd read a paper on the "Occurrence at Ardrossan of the Corky-scab Potato-Disease," *Spongospora scabies* (Berk.) Mass. (pp. 82-85).

Mr. James Whitton, Superintendent of Parks, Glasgow, submitted a paper entitled "Meteorological Notes and Remarks upon the Weather during the year 1910, with its effects upon Vegetation." In comparing the records for 1910 with those for the previous year, the rainfall is almost identical, being 38·56 in 1910 and 38·26 in 1909, in both cases about the average for this district. The wettest month in 1910 was August, with 5·45 inches, closely followed by July with 5·20 inches. October proved the driest month with the low rainfall of 1·16 inches. The barometrical readings showed the wide range of over two inches during the year. The highest readings were 30·50 inches on 14th October, 30·40 on 31st March, and 30·35 on 21st and 22nd September. The lowest readings were 28·45 inches on 7th November, 28·50 on 17th February, and 28·70 on 24th January and 10th December. In regard to the temperature, with a smaller proportion of easterly winds and comparative absence of severe frosts, the mean temperature was higher than in 1909. The easterly group of winds obtained on 138 days and the westerly on 220 days. The easterly winds in the spring months unduly retarded vegetation, and during the flowering period of trees and shrubs, caused much damage to the tender growths, and by injuring the blossom, ruined the prospects of a fruit crop. Generally speaking, the display of bloom was under the average on trees and shrubs. The hard dry winds lacerated and browned the first leaves on Chestnuts and Acers in exposed places, and many of them were in a pitiable condition. Later-growing trees and shrubs fared better and made a satisfactory growth which ripened well, consequently the prospects for 1911 were favourable.

The eighth meeting of the sixtieth session took place on 25th April, 1911, Mr. John Paterson, President, in the chair. Mr. William Gillies, 25 University Gardens, was elected as an ordinary member.

Reports of excursions to Blair Policies and Hindog Glen, Dalry, and Ardgartan, Loch Long, were submitted.

Mr. Alexander Ross, Hon. Secretary, exhibited *Pinguicula lusitanica*, L., from Kames, Kyles of Bute, where it grows plentifully.

Specimens of *Helophorus tuberculatus* (Gyll.) were shown by Mr. William M'Leod. This rare beetle has been taken only twice before in Britain. Mr. M'Leod found it at Drumpellier, in Lanarkshire, in some number in moss in a peaty moor which during winter is usually wet. It is an addition to the fauna of the Clyde area.

Lantern slides, appealing to varied interests, were shown by Messrs. Herriot, J. R. Jack, J. Robertson, W. M. Pettigrew, and J. R. Thomson.

Mr. R. S. Wishart, M.A., read a paper on "Silver-tree Seeds and Seedlings" (pp. 86-92).

The President (Mr. John Paterson) submitted a preliminary report on "The Return of Summer-Birds to the Clyde Area in 1911" (pp. 92-95).

The ninth meeting of the sixtieth session was held on 30th May, 1911, Mr. John R. Lee, Vice-President, in the chair.

Mr. Colin C. B. Gilmour, M.A., 13 Willowbank Crescent, was elected as an ordinary member.

Reports of excursions to Polbath Burn and Loudoun Castle and Loch Riddon were submitted.

Mr. Johnston Shearer exhibited a Pathan sword and powder horn and an oak picture frame, all destroyed by two small species of Indian insects, viz., "woolly bears" and white ants.

Professor L. A. L. King gave a most interesting lecture on Shore Hunting.

The tenth meeting of the sixtieth session took place on 27th June, 1911, Mr. W. R. Baxter, Vice-President, in the chair. Mr. Hugh S. Gladstone, Capenoch, Thornhill, was elected as an ordinary member.

Mr. John Gloag sent for exhibition some white leaves of the Lime tree. They were from a tree near Loudoun Castle, and were taken from a branch attached to the bole about 20 feet

from the ground. Though there are never any green leaves on this branch, yet it is increasing in size and has this year a finer display of colourless leaves than usual.

Mr. John Robertson exhibited fresh specimens of the following plants, from Kirkoswald Parish, Ayrshire:—*Vicia sylvatica*, L.; *Adoxa Moschatellina*, L.; *Neottia Nidus-avis*, Rich.; *Orchis latifolia*, L.; *Habenaria conopsea*, Benth.; *H. bifolia*, Br.; *H. chloroleuca*, Rid.; and *Ophioglossum vulgatum*, L. With the exception of *Vicia sylvatica* and *Habenaria bifolia*, these plants are not mentioned in Mr. John Smith's "Botany of Ayrshire" as being found in Kirkoswald Parish, though *Neottia Nidus-avis* has been recorded since the publication of the work named. *Vicia sylvatica* Mr. Robertson also found in Maybole Parish, apparently a new record. Mr. Robertson further exhibited fine examples of the Jew's-ear fungus (*Hirneola auricula-Judæ*, Berk.), which he found growing near the village of Kirkoswald.

Mr. John Renwick read some notes on "Large Grey Poplars at Mauldslie Castle" (pp. 119-120).

Mr. Renwick also read a paper entitled "Notes on the Ash Trees of the Clyde Drainage Area" (pp. 105-114).

Note.

Great Skua (*Megalestris catarrhactes*) **off the Ayrshire Coast in July.** It may be interesting to record that, on 7th July this year, I saw a Great Skua half-a-mile north-west of Dunure. It is strange that it seems to wander further in the breeding season than at any other time, as I have seen it but twice before, always in July.—John M'Crindle, Dunure.

Reviews.

The Life of the Common Gull told in Photographs.
—By C. Rubow. Witherby & Co., London; 1s. 6d. net.

Seeing this work favourably noticed in several journals, we wrote to Copenhagen for a copy, but failed to get it. It is, therefore, with real gratification that we have received from

Messrs. Witherby this Danish work in an English dress. In a series of five and twenty pictures, reproductions of photographs from nature in nearly every case, the life of the Common Gull is told. In addition, a short narrative-life is given. The pictures are most excellent. Among the recent numerous attempts to illustrate bird-life by such means this must be reckoned one of the best.

Bird Protection and the Feather Trade.—By Dr. A. Menegaux, Assistant in the Department of Ornithology at the National Museum of Natural History, Paris. Sampson, Low, Marston, & Co., Ltd., London; 6d.

The modest form and price of this publication might mislead the unwary as to its value and interest. It contains valuable information upon the recent disappearance of sundry species, the importance of poultry in the feather trade, the objections against the trade, protective measures in vigour (more or less), and advisable measures to be taken. It also contains three appendices—one of them the Hon. Walter Rothschild's list of species of birds which have become extinct within the last 500 years, or which are in danger of extinction.

Modern Geography.—By Marion I. Newbigin, D.Sc.(Lond.). Williams & Norgate; 1s.

Physical geography in a narrative form. One of the Home University Library series.

Bulletin of the British Ornithologists' Club, Vol. XXVIII. Witherby & Co., London; 6s.

This volume contains the report on the immigration of summer residents in the spring of 1910, also notes on the migratory movements and records received from light-houses and light-vessels during the autumn of 1909. It is by the committee appointed by the British Ornithologists' Club, and is edited by Mr. W. Ogilvie-Grant. The report is drawn up on lines similar to those of the five previous reports, but the autumn records have been condensed more than formerly, as the committee recognised that the reports were becoming too cumbersome. It appears from the

introduction, that a reviewer of the preceding report thought that the records of past years, showing very minor differences in the arrival of various species, there was little use in continuing investigations on the present lines. We fail to understand the advice, and think the committee would be ill-advised to follow it. The original intention was to collect information for ten years before attempting to generalise it. The modification on this plan that we would prefer to see, would be that the inquiry be continued during the preparation of the digest of the first ten years. Its continuance could then be decided on, if thought necessary, without interrupting the series of reports. The vagaries of our climate considered, an enquiry of this description might be carried on for twenty years, and the results in the last year be more illuminating than those in any preceding year.

INDEX.

- Abraxas grossulariata, var. varleyata, 102
 Accentor modularis, 23, 45
 ACCOUNTS, STATEMENT OF, 104
 Accipiter nisus, 51
 Acer platanoides, 18
 saccharinum, 18
 Acredula rosea, 45
 Acrocephalus phragmitis, 23, 44, 95
 Adoxa Moschatellina, 126
 Ægialitis Hiaticola, 55, 96
 Alauda arvensis, 23, 50
 Alca torda, 58
 Alcedo ispida, 50
 ALGÆ, FRESH-WATER OF "CLYDE," 25-27
 ALIEN PLANTS NEAR PAISLEY, 28-30
 Amaranthus retroflexus, 30
 Ambrosia trifida, 30
 Ampelis garrulus, 122
 Amphitrite cirrata, 79
 johnstoni, 77, 79, 80
 Anas boschas, 24, 52
 strepera, 53
 Anser segetum, 51, 52
 Anthemis Cotula, 30
 Anthus pratensis, 46
 trivialis, 46, 94
 AQUATIC LARVÆ, REARING, 80
 Ardea cinerea, 23, 52
 ASH TREES, NOTES ON THE, OF "CLYDE,"
 105-114
 MEASUREMENTS OF, IN "CLYDE,"
 115, 118
 Asio accipitrinus, 51
 otus, 51
 AUK, LITTLE, 58
 Avena fatua, 30

 Baccillus fluorescens-liquifaciens, 60, 66
 BARCLAY, ANDREW, 121
 BARTHOLOMEW, JAMES, 71, 92, 97
 Bartramia Halleriana, 123
 pomiformis, var. crispa, 123
 BAXTER, W. R., 95, 99, 101, 121, 125
 BEETLE NEW TO SCIENCE FROM POSSIL AND
 FRANKFIELD, 36
 Bernicla brenta, 52
 leucopsis, 52
 Betula alba, 16
 nana, 16
 nigra, 17
 Bipalium kewense, 121

 BIRDS OF EAST RENFREW, 41-59
 NIGHT-NOTES OF, 22-25
 RETURN OF SUMMER—TO "CLYDE,"
 1911, 92-95
 BLACKBIRD, 22, 43
 BLACKCAP, 44
 BOYD, D. A., 82, 101, 102, 124
 BRAMBLING, 48
 Brenthis (Argynnis) selene, aberration
 transversa, 103
 BROWN, DR. R., 123
 BRUCE, DAVID, 99
 BUCHANAN, K. & R. M., 33
 MATTHEW, T., 102
 Bufo calamita, 122
 BULLFINCH, 48
 BUNTING, CORN, 48
 REED, 49
 SNOW, 49
 YELLOW, 23, 49
 Bupleurum rotundifolium, 29

 Callitriche hamulata, 32, 100
 Calluna vulgaris, var. incana, 103
 CALVERT, WM., 121
 Camelina sativa, 29
 rar. foetida, 29
 Caucalis daucoides, 29
 latifolia, 29
 Caprimulgus europæus, 50
 Carduelis elegans, 47
 spinus, 35, 37, 47
 Carex Halleri, 32
 alpina, 100
 Cassida nobilis IN DUMBARTON, 96
 Cercis siliquastrum, 18
 Certhia familiaris, 46
 CHADWICK, W. L., 93, 94
 CHAFFINCH, 47
 Charadrius pluvialis, 24, 55
 Chelidon urbica, 47, 93
 CHIFFCHAFF, 44, 93
 Chlorobotrys regularis, 27
 Chlorocytrium lemnæ, 27
 Chroococcus turgidus, 27
 Cicadetta montana, 102
 Cichorium Intybus, 30
 Cinclus aquaticus, 45
 Circus cyaneus, 51
 Cirsium arvense, var. setosum, i. argen-
 teum, 30

- Cladothrix dichotoma*, 59, 60, 61, 62, 65,
 69, 70, 103
 polyspora, 60
Clangula glaucion, 24, 53
Coleochaete nitellarum, 26
 pulvinata, 26
 scutata, 26
 soluta, 26
Columba oenas, 54
 palumbus, 24, 54
Colymbus arcticus, 59
 septentrionalis, 59
Conringia orientalis, 29
Convolvulus arvensis, 30
 CONNELL, J. G., 122
 COOT, 24, 55
 CORMORANT, 151
Corvus corax, 49
 corone, 49
 cornix, 50
 frugilegus, 50
 monedula, 49
Cosmarium Meneghinii f. *octangularis*,
 27
 quadratum, 27
 reniforme, 27
Cotile riparia, 47, 94
Coturnix communis, 54
 CRAIG, A. T., 99
 CRAKE, CORN-, 54, 94
 CREEPER, TREE-, 46
Crex pratensis, 54, 94
 CRICHTON, JESSIE H., 121
Cronartium ribicolum, 101
 CROSSBILL, 48
 CROW, CARRION-, 49
 HOODED, 49
 CUCKOO, 23, 50, 94
Cuculus canorus, 23, 50, 94
Cucurbitaria piceæ, 101
Cupressus disticha, 17
 CURLEW, 25, 57
Cygnus bewicki, 52
 olor, 52
Cypselus apus, 50, 95
Cytisus alpinum, 18

Dædalia quercina, 102
Dafila acuta, 53, 122
 DALGLISH, A. A., 101, 103
Datura stramonium, 30
Delphinium Ajacis, 28
Dendrocopos major, 97
Desmidium Swartzii, 26, 27
Diplophyllum albicans, 71
 DIPPER, 45
 DIVER, BLACK-THROATED, 59
 RED-THROATED, 59

 DOVE, RING-, 24, 54
 STOCK-, 54
 TURTLE-, IN RENFREW, 96
Draba incana, var. *confusa*, 31, 99
 f. *gracilis*, 31
 f. *hebecarph*, 31
 f. *legitima*, 31
 f. *stricta*, 31
 DUCK, LONG-TAILED, 53
 SCAUP, 53, IN RENFREW, 96
 SHELD, COMMON, 52
 TUFTED, 53
 DUNLIN, 25 56

 ELLIS, DAVID, D.Sc., &c., 59, 103
Emberiza citrinella, 23, 49
 miliaria, 48
 schœniclus, 49
Erophila verna, 31, 99
Erysimum cheiranthoides, 29
 repandum, 29
Euastrum bidentatum, 27
 EVANS, WM., 96
 EWING, P., 31, 99, 102, 103

Falco æsalon, 51
 peregrinus, 51
 subbuteo, 51
 tinnunculus, 51
 Falcon, Peregrine, 51
 FERGUSON, D., 28
 Anderson, 36, 101
 FIELDFARE, 22, 43
 FLAMINGO IN DUMBARTON, 35
 IN CLYDE ESTUARY, 71
 FLOWERING-PLANTS, ON SOME, 31-2
 FLYCATCHER, SPOTTED, 46, 95
Fratercula arctica, 59
Fraxinus excelsior, 105
 var. *monophylla*, 116, 117
 ornus, 17
Fringilla cœlebs, 47
 montifringilla, 48
Fulica atra, 24, 55
Fuligula cristata, 53
 ferina, 53
 marila, 53
 IN RENFREW, 96

 GADWALL, 52
Galerucella fergussoni, 36, 101
 nymphææ, 36
Gallinago cœlestis, 24, 55
 gallinula, 56
 major, 55
Gallinula chloropus, 24, 55

GANNET, 51
 GARDEN-WARBLER, 44
 Garrulus glandarius, 32, 49
 GEESE, 23
 GOOSE, BEAN, 52
 BERNACLE, 52
 BRENT, 52
 GEMMILL, JAS. F., 77, 122
 GENTIAN OF THE HIGH ALPS, 123
 GILCHRIST, A., 99
 GILLIES, WM., 124
 GILMOUR, COLIN C. B., 125
 GLADSTONE, HUGH S., 125
 Glaucium corniculatum, 29
 Gleditsia triacanthus (sic), 17
 GLOAG, JOHN, 125
 Gleocapsa Ralfsiana, 27
 Gleotrichia Pisum, 27
 GODWIT, BAR-TAILED, 25
 BLACK-TAILED, 57
 GOLDENEYE, 24, 53
 GOLDFINCH, 47
 GREBE, GREAT-CRESTED, 59
 LITTLE, 59
 RED-NECKED, 59
 SCLAVONIAN, 59
 Greenfinch, 47
 GREENSHANK, 57
 GROUSE, BLACK, 54
 RED, 54
 Gryllotalpa gryllotalpa, 99
 GUILLEMOT, 58
 IN GLASGOW HARBOUR, 33
 IN RENFREWSHIRE, 33
 GULL, BLACK-HEADED, 25, 58
 COMMON, 58
 GLAUCOUS, 96
 GREAT BLACK-BACKED, 58
 HERRING, 58
 ICELAND, 96
 KITTIWAKE, 25, 58
 LESSER BLACK-BACKED, 58, 92
 SABINE'S, 57

 Habenaria bifolia, 126
 chloroleuca, 126
 Conopsea, 126
 Hematopus ostralegus, 24, 55
 Hapalosiphon Hibernicus, 27
 Harelda glacialis, 53
 HARRIER, HEN-, 51
 HAWK, SPARROW-, 51
 Helophorus tuberculatus, 125
 Henderson, Dr. T. B., 102, 122
 HERON, 23, 52
 HERRIOT, GEO., 103, 125
 Hirneola auricula-Judæ, 126
 Hirundo rustica, 49, 93

HOBBY, 51
 HOGG, CHARLES, 121
 Hormospora mutabilis, 26
 ordinata, 26
 HUME, ALEX. J., 121
 Hyrochelidon nigra, 94, 96
 Hyla arborea, 102

Ineffigiata neglecta, 27
 Iynx torquilla, 50

JACKDAW, 49
 JACK, JAMES, 101, 104
 JACK, J. R., 102, 122, 125
 JAY, 49
 INCREASE OF, ON INCHTAVANNACH, 32
 Julus pulchellus, 83
 Juncus tenuis, 32, 100, 103

KESTREL, 51
 KINGFISHER, 50
 KING, J. J. F. X., 99, 102
 L. A. L., 125

LABORATORY AQUARIUM NOTES, 77-81
 Lagopus scoticus, 54
 Lappula echinata, 30
 LAPWING, 24, 55
 Lanice conchilega, 80
 LARK, SKY-, 23, 50
 Larus argentatus, 58
 canus, 58
 fuscus, 58, 92
 glaucus, 96
 leucopterus, 96
 marinus, 58
 ridibundus, 25, 58
 Lathyrus Aphaca, 29
 LEE, JOHN R., 122, 123, 125
 LEIGHTON, WM., 99
 Lemna trisulca, 27
 Lepidium ruderales, 29
 Leptognathus Catesbyi, 102
 Leucadendron argenteum, 86
 Leucodora (Polydora) ciliatus, 77
 Levisticum officinale, 31, 99
 Ligurinus chloris, 47
 Limosa belgica, 57
 lapponica, 25, 57
 LINNET, 48
 Linum angustifolium, 29
 Linota cannabina, 48
 flaviostris, 48
 linaria, 34, 48, 122

- Liptotena cervi*, 99
Liriodendron tulipifera, 19
Loxia curvirostra, 48
Locustella naevia, 45
 LUNAM, GEORGE, 25, 100, 101
Lysimachia vulgaris, 30

Machetes pugnax, 32, 56
 MAGPIE, 49
 MALLARD, 24, 52
Malva parviflora, 29
 rotundifolia, 29
Mareca penelope, 24, 53
 MARTIN, HOUSE-, 47, 93
 SAND-, 47, 94
Medicago denticulata, 29
 hispida, 29
 MEETING, ANNUAL GENERAL, 100
Megalestris catarrhactes, 126
Melilotus alba, 29
 officinalis, 29
 MERGANSER, RED-BREASTED, 53
Mergus alle, 58
Mergus merganser, 53
 serrator, 53
 MERLIN, 51
 METEOROLOGICAL NOTES FOR 1910, 124
Microthamnion Kützinganum, 26
 MITCHELL, JAMES, 100
 MOORHEN, 24, 55
Motacilla alba, 46, 93
 lugubris, 46
 melanope, 46
 raii, 46, 94
 MOTHERWELL, A. B., 101
 MURE, WILLIAM, 102
Muscicapa grisola, 46, 95
Myosotis arvensis, 30
 M'CONNOCHIE, ALEX. I., 99, 121
 M'CRINDLE, JOHN, 92, 93, 94, 96, 123, 126
 M'CULLOCH, HENRY, 122
 M'KAY, RICH'D., 109, 115
 M'KEITH, T. THORNTON, 50, 93, 94, 95, 122
 M'LEAN, A. S., 99
 M'LEOD, WM., 125

Neottia Nidus-avis, 126
Nettion crecca, 24, 53, 71
Nicola venustiula, 79
Nostoc macrosporum, 27
 microscopicum, 27
Numenius arquata, 25, 57
 phaeopus, 57
Nyctea scandiaca, 51

Oceanodroma leucorhoa, 59
Edogonium undulatum, 26

Ophioglossum vulgatum, 126
Ophryotrocha puerilis, 77, 78
Orchis latifolia, 126
Ornithomyia avicularia, 99
 lagopodis, 99
 OWL, BARN-, 23, 50
 LONG-EARED, 23, 51
 SHORT-EARED, 51
 SNOWY, 51
 TAWNY, 51
 OYSTER-CATCHER, 24, 55

Palmodactylon varium, 27
 PARKER, W. P. R., 99
 PARTRIDGE, 24, 54
Parus ater, 45
 atricapillus kleinschmidti, 45
 cæruleus, 46
 major, 45
 palustris, 45
Passer domesticus, 47
 PATERSON, JOHN, 32, 33, 36, 37, 41, 42, 48, 49, 51, 54, 55, 56, 58, 71, 76, 92, 93, 94, 95, 96, 99, 100, 102, 121, 123, 124, 125
 PETREL, FORK-TAILED, 59
 STORM, 33
 PETTIGREW, WM., 97, 103, 125
Pellia epiphylla, 71
Perdix cinerea, 24, 54
Peridermium strobili, 101
Phalacrocorax carbo, 51
 graculus, 51
Phalaris canariensis, 30
Phasianus colchicus, 24, 54
 PHEASANT, 24, 25
Phenicopter roseus, 35, 71
Phylloscopus rufus, 44, 93
 sibilatrix, 44, 95
 trochilus, 44, 93
Pica rustica, 49
Pinguicula lusitanica, 125
 PINTAIL, 53, 122
Pinus balsamea, 18
 canadensis, 19
 Cembra, 101
 Lambertiana, 101
 Strobus, 101
 PIPIT, MEADOW, 46
 TREE, 46, 94
Plantago Coronopus, var. *maritima*, 32, 100
Plectrophenax nivalis, 49
Pleurotenium Ehrenbergii, 27
 PLOVER, GOLDEN, 24, 55
 Grey, 55
 Ringed, 55
 Ringed, in Lanark, 96
 Pochard, 53

- Podiceps auritus*, 59
 cristatus, 59
 fluviatilis, 59
 griseigena, 59
 POLYCHÆTE, NEW CLYDE RECORDS, 77-80
 POPLARS, GREY, AT MAULDSLIE, 119, 120
Populus alba, 119
 canescens, 119, 120
 POTATO-DISEASE, CORKY-SCAB AT AERDROSSAN, 82-85
Pratincola rubetra, 43, 94
 rubicola, 43
Primula scotica, 31, 99
Procellaria pelagica, 33
Protoderma viride, 27
 PUFFIN, 59
Pyrrhula europæa, 43
- QUAIL, 84
Quercus Ægilops, 18
- Radiococcus nimbatus*, 27
 RAIL, WATER, 54
Rallus aquaticus, 54
Rana esculenta, 102
Ranunculus arvensis, 28
 RAVEN, 49
 RAZORBILL, 58
 REDBREAST, 43
 REDSHANK, 25, 56
 SPOTTED, 57
 REDSTART, 43, 95
 REDWING, 22, 42
Regulus cristatus, 44
 REID, N., 120
 RENNIE, W., 92, 93, 94, 95, 97
 RENSHAW, C. STEPHEN BINE, 94, 97
 RENWICK, JOHN, 34, 100, 105, 115, 119, 126
Reseda lutea, 29
 REVIEWS—
 THE HOME-LIFE OF THE SPOONBILL, 38
 THE BIRDS OF DUMFRIESSHIRE, 38, 40
 THE LIVERWORTS: BRITISH AND FOREIGN, 71-2
 PHOTOGRAPHY FOR BIRD-LOVERS, 97
 HOW TO ATTRACT AND PROTECT WILD-BIRDS, 98
 LIFE OF THE COMMON GULL IN PHOTOGRAPHS, 126-7
 BIRD-PROTECTION AND THE FEATHER TRADE, 127
 MODERN GEOGRAPHY, 127
 BULLETIN OF THE BRIT. ORNITH. CLUB, 127
Ribes nigrum, 101
 RING-OUZEL, 43
- Rissa tridactyla*, 25, 58
 ROBERTSON, MRS. DAVID, 99
 JOHN, 22, 41, 93, 95, 96, 122, 125, 126
 ROOK, 50
 ROSS, ALEX., 34, 93, 94, 95, 97, 100, 125
 RUFF IN LANARK, 32
 IN RENFREW, 56
Ruticilla phœnicurus, 43, 95
- SABELLA*, TUBE-BUILDING IN, 80, 81
Sabella pavonina, 81
Salix amerina, 19
 fragilis, 17
 phloragna, 19
 SANDPIPER, COMMON, 25, 56, 93
 CURLEW, 56
 GREEN, 56
Saponaria Vaccaria, 29
Satureia Acinos, 30
Saxicola cenanthe, 43, 92
Scandix pecten-veneris, 31, 99
Scolopax rusticola, 24, 55
Scenedesmus acutus, 27
 obliquus, 27
Scytonema mirabile, 27
Sedum villosum, 31, 99
 SERVICE, ROBERT, IN MEMORIAM, 73-76
Setaria viridis, 30
 SHAG, 51
 SHANKS, A., 93
 SHEARER, JOHNSTON, 125
 SHOVELLER, 53
Silene noctiflora, 29
 SKUA, GREAT, 126
 SILVER-TREE SEEDS AND SEEDLINGS, 86-92
 SIMPSON, JAMES, 121
 SISKIN, 34, 47
Sisymbrium Sophia, 29
 SMITH, JOHN, 121
 SNIPE, COMMON, 24, 55
 GREAT, 55
 JACK, 56
 SOMERVILLE, D. R., 99
 SOMMERVILLE, JOSEPH, 101, 104
Sorosporium scabies, 83
 SPARROW, HEDGE-, 23, 45
 HOUSE-, 47
Spatula clypeata, 53
Spirogyra nitida, 27
Spongospora scabies, 82-124
 solani, 83
 subterranea, 85
Squatarola helvetica, 55
 STARLING, 23, 49
Staurastrum dejectum, 27
Sterna fluviatilis, 57, 94

- Stigonema turfaceum*, 27
 STINT, LITTLE, 56
 STONECHAT, 43
Strix flammea, 50
Sturnus vulgaris, 23, 49
Sula bas-ana, 51
 SUMMER VISITORS' (BIRDS) ARRIVALS IN
 IN SCOTLAND AND NORTH ENGLAND, 36-7
 SWALLOW, 46
 SWAN, BEWICK'S, 52
 MUTE, 52
 SWIFT, 50, 95
 SYCAMORE, A NOTABLE, 34
Sylvia atricapilla, 44
 cinerea, 43, 95
 curruca, 44
 hortensis, 44, 95
Syrnium aluco, 51

Tadorna cornuta, 52
 TEAL, 24, 53, 71
 TEMPLETON, R. T., 102
Terebella daniellseni, 79
 nebulosa, 79
 TERN, COMMON, 57, 94
 BLACK, 94, 96
Tetrao tetrix, 54
Tetraxis Browniana, 123
 pellucida, 123
Thelepus circinnatus, 79
Thlaspi arvense, 29
 Thomson, J. R., 125
 THRUSH, SONG, 22, 42
 MISTLE, 42
 TITMOUSE, BLUE, 46
 COAL-, 45
 GREAT, 45
 LONG-TAILED, 45
 MARSH-, 45, 122
 WILLOW-, 45, 122
 TOAD, NATTERJACK, 122
Totanus calidris, 25, 56
 canescens, 57
 fuscus, 57
 hypoleucus, 25, 56, 93
 ochropus, 56
 TREE-PLANTING IN SCOTLAND, 1-21
 TREES, 1-21
 NATIVE, 16-17
 INTRODUCTION OF, WITH DATES, 17-19
Trifolium arvense, 29
Triglochin palustre, 32
Tringa alpina, 25, 26
 minuta, 56
 subarquata, 56
Troglodytes parvulus, 46

Tubercinia scabies, 82
Turdus iliacus, 22, 42
 merula, 22, 43
 musicus, 22, 42
 pilaris, 22, 43
 torquatus, 43
 viscivorus, 43
Turtur communis IN RENFREW, 96
 TWITE, 48

Ulothrix subtilis, 26
Uria troile, 33, 58
Utricularia intermedia, 31, 99

Vanellus cristatus, 24
 vulgaris, 55
Veronica hederifolia, 31, 99
 officinalis, var. *hirsuta*, 103
Vicia bithynica lutea, 29
 sylvatica, 126

 WAGTAIL, GREY, 46
 PIED, 46
 WHITE, 46, 93 -
 Yellow, 46, 94
 Warbler, Garden-, 95
 Grasshopper-, 145
 Sedge-, 23, 44, 95
 WATER-HEN, 24, 55
 WATT, HUGH BOYD, 1, 58, 102
 WAXWING, 122
 WHEATEAR, 43, 92
 WHIMBREL, 57
 WHINCHAT, 43, 94
 WHITETHROAT, 43 95
 LESSER, 44
 WHITTON, JAS., 119, 120, 124
 WIGEON, 24, 53
 WILSON, ROBERT, W.S., 35, 45, 49, 51,
 92, 95, 96, 101, 122
 HUGH, 49, 94, 95, 96
 WISHART, R. S., 86, 125
 WOODCOCK, 24, 55
 WOODPECKER, GREAT SPOTTED, IN
 LANARK, 97
 WREN, 46
 GOLDEN-CRESTED, 44
 WILLOW-, 44, 193
 WOOD-, 44, 95
 WRYNECK,

Xema sabinii, 57

Zygnema anomalum, 27

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